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Financial Intermediation and Growth

Chinese Style

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Abstract

Boyreau-Debray analyzes the relationship between growth and financial intermediation at the subnational level within China. Does the quality of the banking sector in a province affect its rate of growth? Do state and nonstate banking sectors perform differently? Does the structure of the local banking sector affect the rate of provincial economic growth? To answer these questions, the author first uses evidence on the fragmentation of regional capital markets to justify the existence of local credit channels. Second, using a dataset of 26 provinces between 1990 and 1999, she defines and introduces indicators of local banking development into the traditional growth regression framework using the GMM-system estimator. The results suggest that credit extended by the banking sector at the state level has a negative impact on provincial economic growth. This negative effect appears to be attributable to the burden of supporting the state-owned corporate sector rather than to the poor performance of state-owned banks. Moreover, provinces with more diversified banking sectors appear to grow faster.

This paper—a product of Investment Climate, Development Research Group—is part of a larger effort in the group to understand China's economic and financial development. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Paulina Sintim-Aboagye, room MC3-300, telephone 202-473-8526, fax 202-522-1155, email address psintimabaogye@worldbank.org. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at gboyreaudebray@worldbank.org. April 2003. (56 pages)

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1. Introduction

China has maintained a high rate of economic growth since the early 1980s—averaging 9.5 percent per year—while also implementing reforms aimed at transitioning from a planned economy to a market economy. During this time, the non-state sector has steadily expanded. In 2000, non-state enterprises accounted for more than 80 percent of production. The financial deepening of the Chinese economy has also been impressive. The total liquidity of the banking sector has increased from 30 percent of GDP in 1979 to 148 percent of GDP in 1999, one of the highest ratios in the world. After two decades of reform, however, the transition to a modern and profit-oriented banking sector is far from being achieved. Four big state banks dominate the market and allocate most of their financial resources to the inefficient and loss-making state-owned enterprise sector. In 2000, three-quarters of all bank lending was channeled toward state-owned enterprises, despite their plummeting contribution to national output.

The coexistence of fast economic development and financial deepening with a massive misallocation of financial resources in China is puzzling, as it does not follow the expected growth and finance relationship. According to this literature, both theoretical and empirical evidence suggests a positive relationship between financial and economic development, and that the development of financial markets and institutions is a critical and inextricable part of the growth process (Levine 1997). A crucial question is, however, what is the direction of causality between the two processes, e.g., whether financial development passively follows economic development or whether it is an important determinant of economic growth. Given the endogenous nature of the relationship, cross-countries studies have usually relied on instrumentation techniques to extract the exogenous component of financial development. The availability of new econometric techniques for analyzing panel data that control for endogeneity, however, is providing impetus to the empirical literature on finance and growth.[1]

This paper analyzes the relationship between growth and financial intermediation in China by applying the traditional cross-country empirical framework to a panel of Chinese provinces. A number of studies have analyzed the growth patterns of the Chinese provinces, with a focus on the role of openness, foreign direct investment, or infrastructure[2]. The impact of financial intermediation on growth has received little attention, which is surprising given the importance of the issue in terms of policy implications and the challenges posed by the increase of competition in the financial

[1] See Levine, Loayza, and Beck. (1999).

[2] See among others, Chen and Fleisher (1996), Jian, Sachs, and Warner (1996), Raiser (1998), Demurger and others (2002).

sector that will follow China's accession to the World Trade Organization (WTO).[3] One could argue that studying the relationship between finance and growth at the intranational level is meaningless because intranational capital markets are assumed to be perfectly integrated. Available evidence, however, suggests the existence of a credit channel at the local level.[4] For instance, Hansen, McPherson, and Waller (2000) show that even in a financially developed economy such as the United States local banks affect the performance of the local economy. In the case of China, the assumption of perfect capital mobility is even more questionable, given the strong presumption of local market fragmentation regarding goods, labor, and capital.

This paper proceeds as follows: Section 1 characterizes China's banking development by comparing the value of financial intermediation indicators in this country with an international sample of countries. Section 2 documents the evidence of capital market fragmentation in China, relying on previous evidence and on a test for capital mobility between the Chinese provinces. Section 4 presents the methodology used to analyze the impact of the local banking sector development on local economic performance and estimates the impact of the local banking sector development on local economic performance in China. Section 5 concludes.

2. Financial Intermediation in China: International Comparison

According to Levine (1997), the financial sector contributes to economic growth through five main channels: (1) facilitating the trading, hedging, diversifying, and pooling of risk; (2) allocating resources; (3) monitoring managers and exerting corporate control; (4) mobilizing savings; and (5) facilitating the exchange of goods and services. Ideally, we want to select indicators that reflect the quality of financial services when analyzing the impact of financial intermediation on economic growth. However, only quantitative indicators are available in a wide enough range to make cross-country comparisons. The three indicators of banking sector development are traditionally defined as follows.[5] The first indicator, usually used as a measure of financial depth, is the ratio of liquid liabilities to GDP, including currency and demand and interest-bearing deposits of banks and non-bank financial intermediaries. The underlying assumption is that the quality of financial services is positively correlated with the size of the financial intermediary sector. The second indicator of financial intermediation is the ratio of commercial bank assets to commercial bank and central banks assets. It measures the degree to which commercial banks versus the central bank allocate society's savings, and

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[3] See Li and Liu (2001), who study the impact of investment financing sources on industrial growth; Dayal-Gulati and Husain (2000), who introduce in their growth regression financial variables among other variables of interest; and Park and Sehrt (2001), who develop empirical tests of financial intermediation.

[4] See Hansen McPherson and Waller (2000), Samolky (1994) and Neely and Wheelock (1997).

[5] See Beck, Demirgüç-Kunt, and Levine (2000).

assumes implicitly that the banks perform better than the central bank in allocating financial resources. The third and last indicator of financial intermediation is the ratio of credit extended by financial intermediaries to the private sector to GDP, as opposed to governments, government agencies, and public enterprises. The assumption is that financial systems that allocate more credit to private firms are more engaged in researching firms, exerting control, providing risk management services, mobilizing savings, and facilitating transactions than financial systems that simply funnel credit to the government or state-owned enterprises.

We calculate these three indicators for China and the 78 countries included in the financial dataset of the World Bank (Beck, Demirgüç-Kunt, and Levine 2000) for the years 1979 (the beginning of the reform period in China), 1985 (the year following the central bank creation People's Bank of China), and 1999 (the most recent year of data availability[6]). The 79 observations are subsequently sorted by ascending order for each year in order to locate China within the sample.

China's financial deepening is impressive. Financial depth measured by the ratio of total bank liquidity to GDP has increased from 33 percent of GDP in 1979 to 148 percent in 1999. When compared to an international set of countries, China's liquidity rate ranks among the highest in the world in the late 1990s—only Switzerland and Malta have higher liquidity ratios (Figure 1a). By contrast, China ranked 37th among the 79 countries in 1979 (Figure 1b). What are the factors accounting for such a dramatic increase in real monetary balances? First, an increase in monetary transactions has been generated by the monetization of the economy, defined as the increase of the amount of transactions going through the market pushed by a combination of factors: the de-collectivization of agriculture, the development of rural industry, and the development of free markets together with the gradual withdrawal of state monopolies. Hence, the ratio of money (M1) to GDP has increased from 19 percent in 1978 to 53 percent in 1999. Real balances for savings have grown even faster. The ratio of quasi-money has increased from 10 percent in 1978 to 81 percent in 1999. This financial deepening can be explained by the change in income distribution from the government to the households over the transition period because of dismantling state monopolies and the rapid development of the non-state economy. The increase in the household saving propensity can be explained by several factors. First, economic growth increased the saving rate along with higher expectations of future income.[7] Another growth-related factor is the diversification of needs stemming from improved living standards and the availability of new consumption

[6] In the World Bank database, end-of-year financial balance sheet items are deflated by indices and the GDP series is deflated by average consumer prices. For comparing China's financial indicators with international values, we simply use nominal figures, thereby implicitly assuming a common deflator for numerators and denominators.

[7] Friedman (1957) and Kraay (2000) find that expectations of future income growth are an important determinant of household saving in China.

goods. Credit constraint plays an important role also. Consumer credit is just starting to develop in China and households face a cash-in-advance constraint for consuming or investing. Demographic factors such as an increase in life expectancy and an aging population also matter. In addition, growing employment opportunities in the non-state sector with limited social welfare by contrast with the state sector have increased future income uncertainties and precautionary savings. Finally, the guarantee of deposits in the state banks has kept household savings in the form of monetary assets despite the emergence of alternative ways of saving (stock market, government bonds, and more recently private housing). The state banks have been asked to channel savings to the loss-making state-owned enterprises (SOEs). However, their ability to do so depends critically on the savers' behavior and their willingness to place funds in the state-banking sector. As a result, the government commitment to bailout the state-owned enterprises has resulted in an implicit guarantee of the deposits in the state-owned banks (SOB).

Turning to the second indicator, China's share of commercial bank credit in total credit to the economy equals 94 percent of GDP in 1985 and 98 percent of GDP in 1999, situating the country in the upper quartile of the sample, at a level similar to industrialized countries such as Canada or United States (Figures 2b and 2a, respectively). In other words, the role of the People's Bank of China in credit allocation appears relatively modest. Interpreting this result as a signal of efficiency can be however misleading given the two weaknesses associated with this indicator (see Levine 1997). First, banks are not the only financial intermediaries providing financial functions and, second, banks may lend to the government or public enterprises. The first pitfall is not likely to create serious biases in the case of China, as the financial system remains mostly bank-based. In the late 1990s the non-banking financial institutions market share of loans was barely 16 percent. The second weakness is of bigger concern for China, as the four state-owned banks dominate the banking sector and have a preferential policy toward lending to state-owned enterprises. The third and last indicator of financial intermediation—the ratio of credit going to the private sector—might thus be more relevant for characterizing China's banking sector.

Chinese SOEs are famous for inefficiency. Despite two decades of incremental reform, the role of state enterprises in China's economy has shrunk in most ways except the proportion of bank lending they consume. In 2000, SOEs accounted for less than one-quarter of industrial output and just over one-third of urban formal employment. Yet conservative estimates suggest they absorbed three-quarters of all bank lending in the late 1990s.[8] This high figure reflects the use of the state-owned bank credit by the

[8] Data is from the Economist Intelligence Unit, "China: Grossly Distorted Product," February 18, 2002. Chinese statistics do not provide direct figures for loans to SOEs. Estimates are calculated by assuming that all lending aside that recorded for foreign invested enterprises, township and village enterprises, and "other" goes to the state sector.

government as a policy instrument to support the state sector.[9] In other words, the state-owned banks have been obliged to support the SOEs, despite *and* because of the low profitability of the latter and their inability to repay their debts.[10] Using an estimate of the share of total credit directed to state enterprises of 90 percent in 1985 and 77.5 percent in 1999, the ratio of private credit to GDP would be 7 percent in 1985 and 14 percent in 1999, which ranks China as 4th and 15th among 79 countries respectively (Figure 3b and 3a). Hence, the allocation of credit shows little improvements during the reform period. At the end of the 1990s, the bulk of credit is still directed to the public sector in China, despite the growing evidence of its structural inefficiency.

To summarize, at the national level China's financial intermediation can be characterized on the one hand by a dramatic financial deepening and on the other hand by a massive misallocation of financial resources. In other words, while the financial sector has managed to facilitate the exchange of goods and services and mobilize savings, it has not yet succeeded in allocating resources efficiently. In the following section, we justify the existence of a local channel between financial intermediation and growth using evidence from capital market fragmentation within China. In section 4, we analyze the impact of banking development on local performance.

3. Capital Market Fragmentation in China

In a fully integrated financial system, households should be able to deposit or invest their savings and firms should be able to borrow anywhere in the economy either through the banking system or through the financial markets. As a result, and after controlling for aggregate shocks, lending by a region's banks and local economic performance should be uncorrelated. Therefore, as a prerequisite for analyzing the impact of local banking development on the local economy in China, we wish to evaluate the degree of capital market fragmentation in China.

China's spatial economic organization is described as a de facto federalism, involving a decentralized economic system in which each region can be considered as an autonomous economic entity in terms of both goods and production factors.[11] Several studies have pointed out that the level of inter-provincial trade in China resembles a loose federation of sovereign states rather than a unified country.[12] In contrast to the well-documented patterns of intra-national trade, no formal study is available on the degree of

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[9] With the deterioration of its fiscal position in the 1980s, the government increasingly shifted the fiscal burden onto banks, thereby converting direct subsidies to firms into bank loans.

[10] It is now commonly estimated that non-performing loans account now for 30 to 40 percent of the state banks' total lending.

[11] See Qian and Xu (1993).

[12] See Poncet (2001).

intra-national capital mobility in China, although the available information supports the view of a high degree of capital market fragmentation.[13]

We estimate the degree of capital mobility within the Chinese provinces by applying the test proposed by Feldstein and Horioka (1980) for international capital mobility[14]. The Feldstein-Horioka (F-H) test for capital mobility relies on the idea that, under the null hypothesis of a perfectly integrated capital market, investment in one region should not be constrained by the available savings in that region and the correlation between local savings and local investment should be low. Conversely, if regional capital markets are fragmented, domestic investment may be closely related to domestic saving as a source of finance. The F-H test may not be ideal in a cross-country context, as it does not give conclusive evidence on the degree of international capital market integration. Furthermore, a low saving-investment correlation can be consistent with various alternatives other than a low degree of capital market integration across countries, such as the presence of currency devaluation risk premiums, and government's efforts to target the level of current account balance by manipulating the exchange rate. However, within a country, the F-H test turns out to be a reasonable indicator of the degree of capital market integration across different regions, as the alternative interpretations mentioned above are not operative within a country. For example, out of six papers that have looked at countries that are known to have an integrated capital market internally (Canada, Germany, Japan, the United Kingdom, and the United States), all have found a very low savings-investment correlation across the regions.[15] This provides the justification for using the F-H test to examine capital market integration within China.

For our sample we use 26 Chinese provinces between 1985 and 2000. The investment rate is the share of gross capital formation in GDP. The saving rate is defined as the ratio of the difference between GDP and total consumption over GDP.[16] Figure 4 shows the relation between saving and investment rates averaged over the period. Two features deserve attention: first, no clear relationship emerges from the cross-sectional dimension. Second, Beijing, Shanghai, and Tianjin appear as outliers.[17] We therefore

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[13] The World Bank (1994) finds no evidence of price or returns to capital convergence across provinces as would be the case if provinces were financially integrated. Also Park and Sehrt (2001) find that deposits are a key determinant of lending given the poor intermediation across institutions and between and within provinces. The importance of deposits in determining the volume of local lending has also increased over time between 1991 and 1997.

[14] See Boyreau-Debray and Wei (2002).

[15] Bayoumi and Rose (1993), Dekle (1996), Iwamoto and van Wincoop (2000), Sinn (1992), Thomas (1993), Yamori (1995).

[16] We have tested for the order of integration of the series using panel unit-root tests (Im, Pesaran, and Shin 1995). Both investment and saving rates are stationary.

[17] Moreover, including municipalities for testing capital mobility might not be relevant as capital mobility between the cities and the surrounding provinces is likely to be high.

estimate the correlation between investment and saving with and without the three municipalities.

Turning to the panel regressions, we use a simple within estimator with individual and time-fixed effects. In a subnational context, time dummies control for national shocks or macro policies that may increase simultaneously saving and investment for a given degree of capital mobility. Table 1 reports the results. Unlike the results of the previous subnational studies, the investment rate is significantly positively related to savings (row 1a, Table 1a). We check the robustness of the results by first using an alternative measure of investment, by subtracting the share of investment financed by the central government (row 2a, Table 1a). Although lower, the investment-saving correlation remains significant. Second, potential biases arising from saving endogeneity with investment are controlled by running 2SLS regressions, using the share of food expenditure in total consumption expenditure as an instrument (Kraay 2000). The positive correlation between investment and saving remains significant (Table 1b) . Overall, the results contrast with the usual finding of the literature, which finds no investment-saving correlation at the subnational level. Instead, the correlations appear closer to cross-country investment-saving correlations, supporting the view of a low degree of capital mobility within Chinese provinces. The results show that China still has a long way to go to reach financial integration. But more importantly for our purpose, they provide a justification for analyzing the impact of local financial intermediation on local growth performance.

4. Financial Intermediation and Growth: Subnational Evidence

This section presents an empirical analysis of the impact of local banking sector on provincial growth performance. First, we present the growth equation to estimate and discuss the econometric method as well as the economic and banking indicators used on the right-hand side. Second, we present and discuss the results.

4.1 Empirical Framework

The data set consists of economic and financial statistics for 26 Chinese provinces and 3 municipalities directly under central government control between 1990 and 1999. All variables are averaged over two years, providing five observations per province.[18] We estimate the following growth equation:

$$y_{it} = a_0 y_{it-T} + a_1 X_{it} + a_2 F_{it} + u_i + t_t + e_{it} \qquad (1)$$

[18] Averaging all the variables over two years results from a compromise between controlling for short-term shocks on the one hand and on the other hand keeping enough observations given the length of the time series (10 years). For variable definitions and statistical sources see the appendix. Due to missing values, Tibet is excluded from the sample.

where y is the real GDP per capita (in logarithm), T is the period length, X is a vector of control variables (or the conditioning information set), F is a vector of financial intermediation indicators, m is a province fixed effect, t is a time fixed effect, and e is the error term, and i and t are, respectively, the provincial and time subscripts.

4.1.1 Econometric Method: GMM System Estimator

Equation (1) confronts us with two econometric issues. First, introducing the lagged dependent variable among the regressors together with fixed individual effects renders the OLS estimator biased and inconsistent even if the e_{it} are not serially correlated, as the lagged dependent variable is correlated with the error term. Second, most of the explanatory variables can be expected to be endogenous with economic growth. We thus need to control for endogeneity arising either from the dynamic specification of the equation or from reverse causation. The Generalized Method of Moments (GMM) is usually used to control for endogeneity arising in panel data models. The first difference GMM estimator, as proposed by Arellano and Bond (1991), involves as a first step taking the first difference of the proposed equation in order to remove the fixed individual effects from the equation. However, in the differenced equation, the error term is still correlated with the lagged dependent variable. The second step consists of instrumenting the explanatory variables. Under the assumption that there is no serial correlation in the error term, the lagged levels of the explanatory variables can be used as instruments of the first differenced variables. In the context of economic growth models, this method has the advantage of avoiding biases related to omitted specific individual effects and to control for endogeneity arising from bi-directional causality. One critical assumption is, however, that lagged levels of variables are good instruments for explaining subsequent first differences. Hence, when the time-series are persistent and the number of time-series is small, which is typically the case in the empirical growth models, the first-differenced GMM estimator is shown to behave poorly (Bond, Hoeffler, and Temple, 2001). In particular, these authors show that the coefficient of the lagged dependent variable tends to be below the corresponding coefficient estimate in the within groups, suggesting GMM first-differences are biased. In the case of growth models, Bond and others (2001) recommend the use of the so-called System-GMM estimator (Blundell and Bond 1998), which uses the information contained in the initial conditions to generate efficient estimators when T is small and variables are highly persistent. The basic idea of this estimator is to use lagged first differences of the variables as instruments for the equation in levels in combination with the usual approach. In the next section, the System-GMM estimator is used for estimating growth equations with financial intermediation indicators. Next, we use the System-GMM method to estimate equation (1).

4.1.2 The Data

Control Variables (Conditioning Information Set)

The vector of control variables X is defined according to the augmented Solow model as proposed by Mankiw, Romer, and Weil (1992). We introduce the investment rate as a proxy for physical capital and the share of population with more than secondary schooling as a proxy for human capital (schooling).[19] Here we depart from the traditional specification used in the empirics on finance and growth, which usually do not introduce the investment rate, and use the initial rather than the contemporary value of human capital in order to avoid biases arising from potential endogeneity of factor accumulation with economic growth.[20] This method, however, gives rise to another bias due to omitted variables as long as physical and human capital accumulation is considered a relevant determinant of economic growth. As emphasized by Bond, Hoeffler, and Temple (2001), the System-GMM methodology allows parameters to be estimated consistently in models with endogenous right-hand side variables by using instrumental variables. We therefore include the current values of physical and human capital accumulation while controlling for endogeneity. The share of non-state production (non-state production) and the ratio of foreign direct investment to GDP (Fdi) are introduced as control variables. The former is an indicator of the macro environment of the local economy (or of the progress of the transition process at the local level) whereas the latter captures the provincial degree of integration to the world economy.

Local Indicators of Financial Intermediation

At the subnational level, none of the three banking development indicators traditionally used in cross-country studies as described above is available. We therefore build four indicators of financial intermediation corresponding as closely as possible to the cross-country ones. Given that information on cash distribution among regions is not available, we simply use the ratio of total deposits of the banking system to GDP as an indicator of the size of the local banking sector (SIZE). Similarly, central bank credit is not available at the province level. Following Lardy (1998) and Dayal-Gulati and Hussain (2002), we use the ratio of loans to deposits of the state-owned banks as a proxy for central bank lending to the provinces (CENTRAL). In China, while the volume of deposits is determined by economic activity, the volume of lending was largely determined by policy objectives, through the credit plan and independently of the ability of branch banks in each region to finance the lending target from local deposits (Lardy 1998). Hence, some rapidly growing provinces could have a low credit quota and be

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[19] We thank Colin Xu for kindly providing us with the schooling series.

[20] This specification is proposed by Barro and Sala-I-Martin (1992) and justified by the need to control for differences in steady states of the economies depending on their structural features and initial conditions.

constrained in their lending relative to the rapid growth of their deposits. Alternatively, branch banks in slower growing regions could be assigned high quotas with insufficient local deposits to finance their lending; and these provinces depended on the central banks to lend them additional funds. Hence, the ratio of SOB credit to SOB deposits provides a measure of the central bank credit to the local branch banks to meet their lending quotas. In the recent years, the administrative targets have been phased out and replaced by a maximum ratio between loans and deposits. The ratios apply to total national lending by individual banks but allow the headquarters to alter credit allocation for specific provinces.[21] Therefore, the ratio of loans to deposits can also be interpreted as a measure of interregional fund allocation, as the state banks are provided with greater flexibility to use within bank transfers to adjust regional needs.

The third indicator of financial intermediation is the ratio of state-owned banks credit to GDP (SOB). As already noted, Chinese statistics do not provide any information on credit allocation between state and non-state enterprises. However, given that the state banks' primary function was to channel savings to state-owned enterprises, the ratio of the state-owned banks credit to GDP can be interpreted as a proxy for the credit channeled to the state-owned sector. For instance, 80 percent of the total amount of credit by the state-owned bank was extended to the state-owned enterprises in the late 1990s. Even with the recent emphasis on profit maximization and management responsibility in the state banking sector, the state banks may still favor the SOEs with which they have a long customer history and which are more likely to be bailed out by the government than non-state enterprises in the case of financial troubles. By contrast, projects in the non-state sector are perceived as more risky because of higher information costs and moral hazard.

Finally, we are interested in assessing whether for a given size of the banking sector its structure matters for local economic growth in China. Since 1984 the initially specialized state banks have been allowed to compete for deposits and loans in each other's previously monopolized markets, and enterprises have been allowed to open accounts with more than one bank.[22] Existing evidence suggests that all the state banks have remained largely involved in the same specialized business areas. However, the development of new financial institutions including national and regional non-state banks, urban and rural credit cooperatives, and non-banking financial institutions has increased the competition for deposits. More importantly, following China's recent WTO accession, foreign banks will be entitled to national treatment without geographic or

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[21] It is questionable whether state banks are actually conforming to these ratios, as the ratios of outstanding loans to total deposits remain well above the authorized ceiling.

[22] When the People's Bank of China was granted the authority of a central bank in 1984, its commercial operations were transferred to four specialized banks: the Agricultural Bank of China for the rural sector, the Industrial and Commercial Bank of China for the industrial sector, the People's Bank Construction Bank of China for long-term investment; and the Bank of China for foreign exchange.

customer restrictions within five years. Hence, the banking sector is about to face strong and intensive competitive pressures from large foreign financial institutions. However, as highlighted by Huang and Qian (2001), the banking and sector is different from the real sector where more competition is considered better, as an increase in competition on the financial side creates a tradeoff between banking stability and banking efficiency. Indeed two main outcomes can result from the weakening of the monopolistic position of the state-banking sector. First, increased competition may result in a drop of saving deposits in the state banks, in turn threatening their ability to finance the state-owned sector and overall financial stability, as the system rests on the continuing willingness of savers to deposit much of their income with state banks. Second, increased bank competition may result in improved efficiency of financial resources allocation and improved access to credit of the non-state sector, thereby fostering economic growth.[23] We use a fourth indicator to account for the banking market structure in the provinces, by calculating an Herfindahl index of bank concentration. If n is the number of banks, i the province and t the period, the index is computed as follows:

$$H_{i,t} = \sum_{j=1}^{n} \left(D_{j,i,t} \Big/ \sum_{j=1}^{n} D_{j,i,t} \right)^2 \qquad (2)$$

Where $D_{j,i,t}$, is the deposits for bank j, the index equals one in case of monopoly and 1/n in case of equal shares among the n banks. The available data allows us to distinguish between n=7 financial institutions, e.g., the four state-owned banks (Agriculture Bank of China, Industrial and Commercial Bank of China, Bank of China, Construction Bank of China), the Bank of Communication, the Rural Credit Cooperatives and the "other financial institutions." Using the deposits of each financial institution, we compute the bank concentration index for each of the 29 regions (26 provinces and 3 municipalities) and the 5 periods (CONCENTRATION).

4.2 Descriptive Statistics and Correlations

Table 2a reports the average value of the control variables and the four banking indicators. The latter exhibit considerable variation across provinces. For instance, SIZE ranges from 60 percent of GDP in Hunan or Anhui to 274 percent of GDP in Beijing municipality or 115 percent of GDP in Shanxi province. SOB is as high as 107 percent in Qinghai but only of 41 percent of GDP in Zhejiang. The pattern of central bank credit to the provinces is also uneven. In Jilin state bank, credit is 1.7 time higher than deposits, whereas in Beijin, Guangdong, or Zhejiang credit outstanding does not even match

[23] Theoretical arguments can be found to support either a positive or a negative effect of bank concentration on economic growth. On the one hand, a lower bank concentration results in a higher amount of credit available for the economy as a whole. Banks with monopoly power would determine an equilibrium with higher loan rates and a smaller quantity of loanable funds. On the other hand, the positive effect derives from the greater incentive for monopolistic banks to establish lending relationships, which in turn promotes firms' access to investment funds. Using a cross-country data set over the period 1989-1996 and several indicators of bank concentration, Cetorelli and Gambera (2001) find, however, that bank concentration has a negative effect on industrial growth.

deposits (0.86). Finally, the market structure of the banking sector in the provinces varies. The provinces associated with the lowest degree of concentration are Shanxi and Jiangsu (0.18), with 0.14 as a benchmark of equal shares among the seven banks. At the opposite extreme come Beijing (0.29) municipality, and Nei Mongolia, Qinghai, Jilin, and Liaoning provinces (0.25).

Table 2b reports the correlations between the set of control variables and the banking indicators. All control variables are positively and highly correlated with each other. The investment rate in GDP is likely to be associated with a high level of human capital (correlation of 0.94), a large share of non-state sector production (correlation of 0.85), as well as a relatively higher ratio of foreign investment in GDP (correlation of 0.96). Similarly, a relatively high share of non-state production is accompanied by a high level of foreign investment in GDP. Similarly, two of the four financial indicators are highly positively correlated: a high rate of SOB loans in GDP is associated with a high level of central bank credit to the province, which is not surprising given the importance of this financing for SOB. SOB is also highly correlated with CONCENTRATION. A relatively high rate of SOB loans also indicates a high degree of concentration of the banking sector. Finally, Table 2b shows the correlation between the four financial indicators and the set of control variables: Size does seem to be related to any of the growth determinants while SOB, Central and Concentration are all highly negatively correlated with the share of non-state production, Fdi, and, to a lower extent, investment rate.

Figures 5 to 8 show the relations between the four averaged banking indicators and the growth rate of GDP per capita and the initial level of GDP per capita, respectively. Regarding the overall size of the local banking sector, the municipalities of Beijing, Tianjin and Shanghai have the highest levels of deposit to GDP ratio, of initial GDP per capita and of per capita GDP growth rate. In contrast to cross-country studies that highlight a positive correlation between the size of the banking sector and growth of GDP per capita, a slightly negative relationship emerges between financial depth and the growth of per capita GDP (Figures 5.1a and 5.2a). Fast growing provinces such as Fujian, Zhejiang, Shandong Jiangsu Hebei, Hubei, and Anhui are associated with a low ratio of total deposits to GDP, whereas provinces with the highest values of deposits to GDP have been growing at a somewhat lower rate (Guangdong, Shaanxi, Shanxi, Ningxia, Gansu and Xinjiang). No clear relation can be seen from Figures 5.1b. and 5.2b between the size of the banking sector and the initial level of GDP per capita. One has to keep in mind that a key assumption underlying the use of the ratio of deposits to GDP as an indicator of financial development is that the size of financial intermediary sector should be positively correlated to the provision and quality of financial services. This assumption is questionable for China, given the quasi-monopoly of the state-owned banks and their

poor performance in allocating resources efficiently. The other indicators that consider the state sector might prove more relevant for China.

Central bank lending seems to be preferably allocated in provinces with lower growth of per capita GDP (Figure 6.a). Similarly, there is a negative correlation between the ratio of SOB lending to GDP and the real growth rate of GDP per capita (Figure 7.a). No clear relation can be detected between central bank or state bank lending and the initial GDP per capita (Figures 6.b and 7.b, respectively). Provinces such as Jilin, Hubei, Qinghai, and Nei Mongolia benefit the most from central bank lending but are neither the poorest nor the richest provinces. By contrast, some of poorest provinces such as Guangxi or Yunnan receive little credit from the central bank. Beijing's deposits exceed by far its corresponding value of credit, suggesting that the capital city is a net contributor to the central bank resources.

Depending on the causality between those two negative relationships, two different interpretations are proposed. In the first case—GDP growth to central bank SOB lending—provinces where the state sector dominates the local economy such as Qinghai, Jilin or Nei Mongolia may suffer from higher rigidities in their labor and product markets which could be in turn be reflected in lower economic performance. The government may compensate those provinces for this structural handicap by softening their budget constraint and providing them with easier access to credit. The other interpretation involves a reverse causality—from SOB lending to economic growth—which would suggest that SOBs are less efficient at allocating resources than other financial institutions, leading to lower growth performance in the provinces where SOBs dominate the local financial sector.

A negative relationship between CONCENTRATION and the growth of per capita GDP emerges from Figure 8.a, suggesting that a monopolistic banking sector is less efficient than a banking sector where banks and enterprises have to compete for scarce financial resources. Bank concentration does not appear to be related with the level of economic development (Figure 8.b). Provinces with similar levels of initial GDP per capita can have very different banking structures with, for instance, middle-income provinces of Qinghai, Nei Mongolia, Jilin Gansu having a relatively more concentrated market than the richer provinces of Shandong, Shanxi, Fujian, Hainan, Hubei, or Hebei.

This statistical description suggests several preliminary results. First, the size of the intermediation sector does not appear to be related to the level of development or to local growth performance. Second, provinces with a lower rate of economic growth receive larger credit flows from the central government. Third, higher market concentration is associated with lower growth performance at the local level. Fourth, the three municipalities exhibit outlying features. Finally, according to the correlations between all the explanatory variables, it seems that a higher share of the non-state sector

is associated with more foreign investment, a lower ratio of state bank loans in GDP, less credit from the central bank, and less concentration in the banking sector.

These bivariate correlations do not, however, allow us to discriminate between the different interrelated hypotheses such as the causality between financial development and growth, the state banking overall performance, the impact of the central bank lending and the effect of bank concentration on local real growth. In the next section, we estimate the significance of financial intermediation on growth by estimating growth equations and controlling for the potential endogeneity of the regressors.

4.3 Econometric Estimation

Table 3a reports the estimates of equation (1), using only the investment rate and the schooling variables as control variables. As suggested by the statistical evidence provided in the previous section, we treat Beijing, Tianjin, and Shanghai as outliers by excluding them from the sample. Moreover, including municipalities in the context of the growth and finance relationship would be questionable as capital mobility is likely to be high between these cities and their surrounding provinces.[24]

Surprisingly, the liquidity indicator has a significant negative impact on economic growth, which contrasts sharply with the usual cross-country result of a positive relationship between the size of the financial sector and economic growth (Table 3a, column 1a). As mentioned before in section 2, financial deepening during the reform period has been impressive at the national level, although not accompanied by an improvement in savings allocation. At the regional level, interior provinces with a relatively lower growth performance are associated with a high ratio of deposits to GDP. Therefore, the implicit assumption that the size of the financial sector is positively correlated to the quality of financial services is questionable in the case of China. A high level of this indicator may not prefigure a high level of financial intermediation development. Park and Sehrt (2001) reach a similar conclusion: they find an inverse relationship between the rate of financial intermediation and the level of economic development among Chinese provinces, suggesting factors other than economic fundamentals play an important role in lending decisions.

State-owned bank credit has a negative and significant impact on local economic growth, supporting the hypothesis that the state-banking sector does not allocate savings efficiently and that provinces with a more developed non-state financial sector may benefit from more efficient resource allocation. Similarly, the more credit a province receives from the central bank, the lower its growth performance (columns 2a and 3a

[24] Indeed, when the three municipalities are included, none of the financial indicators are significant (results available from author).

respectively).[25] Keeping in mind that we control for the endogeneity of the regressors, the direction of causality can be interpreted as running from the central bank lending to economic growth. At first glance, this result seems puzzling: increased availability of financial resources can be thought of as having a positive or insignificant impact on economic growth, but can hardly be thought of as *worsening* local economic performance. Central bank lending can, however, affect local growth performance in a negative way by softening the local budget constraint. Following Kornai (1980), an organization is said to have a soft budget constraint when it expects to be bailed out in case of financial trouble.[26] For instance, some unprofitable enterprises will become profitable only if they undergo restructuring. But since it is costly for an enterprise to restructure, it will only do so if the enterprise would otherwise go bankrupt. Therefore, if the enterprise anticipates that it will be bailed out by the government, it will not restructure. In the case of China, the state-banking sector has been used by the government as a quasi-fiscal instrument to bailout loss-making state enterprises or to deliver specific policy loans without consideration for efficiency. The result has been a growing accumulation of non-performing loans. In compensation for their lack of autonomy, the SOEs were implicitly guaranteed bailouts by the central bank. Given the easy access to central-bank refinancing and the government's commitment to support the state sector, the budget constraint of the state banks is likely to be soft. Thus, the finding of a negative impact of central bank lending on local economic growth can be interpreted as a lack of incentives for the state banks to improve their management or base their lending decisions on efficiency criteria, as they expect the central bank to fulfill their losses. Furthermore, this result supports the idea that the state-owned bank management has not improved in the recent years despite reforms aimed at transforming them into commercial banks responsible for their losses.[27] Greater bank concentration is significantly associated with lower economic growth and remains robust when the size of the intermediary sector is also introduced (columns 4a and 5a, respectively). This result supports the idea that bank competition is likely to improve economic performance as found by Cetorelli and Gamberra (2001) using a cross-country sample. It is also consistent with the evidence shown at the micro level by Cull, Shen, and Xu (2002) that greater entry into the banking sector improves bank performance, which in turn improves resource allocation in the province and leads to higher economic growth. Table 3a also presents the Sargan test for instrument validity, where the null hypothesis states that the instrumental variables are uncorrelated with the residuals, and the serial correlation test,

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[25] When introducing the ratio of loans to deposits, Dayal-Gulati and Hussain (2002) find the same result during the 1988-97 period.

[26] See Maskin and Xu (2001) for a review of soft budget constraints.

[27] Park and Sehrt (2001) analyze financial intermediation efficiency in China between 1991 and 1997 and draw a similar conclusion: "financial intermediation in China is far from efficient and that financial reforms in the mid-1990s have not reversed a worsening trend."

where the null is that the errors exhibit no second order serial correlation. There is no evidence of second order serial correlation and the validity of the instruments cannot be rejected, as shown by the insignificance of test statistics.

The difficulty here is to interpret the three indicators of financial intermediation separately, as they are all closely interrelated. For instance, one can argue that a high level of state-owned bank credit is likely to be explained by the predominance of the state-owned enterprises on the real side of the local economy. As the state-owned banks lend mainly to state-owned enterprises, the negative growth impact of the credit they extend can simply be explained by the poor performance of their clients. A high level of state-bank credit is also likely to be translated into a higher dependence on central-bank lending used to finance the shortfalls between loans and deposits in the SOBs. Similarly, a high ratio of SOB loans to GDP in the local economy is likely to indicate a high degree of banking sector concentration, as the state banks dominate the banking sector. Ideally, we want to distinguish the state banks' negative impact on economic growth explained by their intrinsic performance from the negative impact arising from the importance of the state-owned corporate sector and more generally from a poor economic climate. To do this we run the same regressions while controlling for the significance of the state sector in the local economy.

Figures 9 to 12 show the average levels of SIZE, SOB, CENTRAL and CONCENTRATION related to the share of non-state enterprises in total gross industrial output value (sgovns). With the exception of SIZE, each of these indicators is clearly negatively correlated to the size of the non-state sector. For instance, provinces such as Qinghai, Jilin, Nei Mongolia, Ningxia, Jilin, Gansu, or Guizhou are characterized by a large share of state-industry and a high level of SOB credit, a high level of central-bank lending, and a high bank concentration index. By contrast, the provinces of Zhejiang, Jiangsu, Shandong, Fujian, Henan have a higher share of non-state production, rely less on SOB credit, have a more diversified banking sector, and receive less central-bank financing. These provinces are thus less likely to receive a large amount of policy loans to support state industry. In addition to such arguments, the share of non-state sector production is often used in studies of regional economic growth in China as an indicator for structural macroeconomic differences, such as a differences in the degree of goods and labor market flexibility, differences in the progress of reforms, and more generally for the extent to which a market climate prevails in the province.

Table 3b reports the results when the share of industrial production by non-state-enterprises in total industrial production is added among the regressors. As found in previous studies, provinces more advanced in the transition process benefit from a higher rate of real growth, as shown by the positive and significant coefficient of the share of the non-state production. Interestingly, the financial deepening variable is now insignificant (column 2b). As a result its negative impact in the base model comes from the fact that

the provinces with the highest liquidity rates are also the ones associated with the highest share of state production, meaning that a high ratio of deposits to GDP is more the result of a preferential credit policy than the result of financial deepening in the local economy. Another interesting result is that the ratio of the share of SOB credit ceases to be significant when we control for the importance of state-owned industry at the local level. Its negative impact in previous regressions was more related to the bad performance of the state enterprises than the misallocation of credit by the SOB per se (column 2b). The negative effect of central-bank lending to the provinces and the bank concentration index both remain significant when we control for the share of state-owned industry (columns 3b and 4b).

We are also interested in checking whether the good growth performance in some Chinese provinces comes from easy access to foreign savings, e.g., mostly in the form of foreign direct investment. Non-state enterprises face different financing constraints depending on their access to foreign capital. Some provinces such as Guangdong, Fujian, or Hainan have received foreign direct investment ranging from 11 to 14 percent of GDP during the 1990s, while more remote areas such as Ningxia, Nei Mongolia, Guizhou or Yunnan provinces received almost nothing.[28] Foreign investment is usually found to be a general indicator of openness and a robust determinant of provincial growth.[29] However, when we introduce the ratio of foreign investment into our growth regressions (Table 3c), foreign investment enters none of the regressions significantly while the other coefficient estimates remain unchanged.[30] This latter result is in line with Carkovi and Levine (2002) who find no evidence of a causal impact of foreign investment on economic growth once the endogeneity of Fdi with economic growth is taken into account.

Now turning to the significance of the control variables, the results are somewhat disappointing. Physical capital accumulation enters only three regressions significantly (column 4b in Table 3b and columns 1c and 2c in Table 3c) whereas human capital accumulation is only significant in one of the regressions (column 3b in Table 3b). The same result can be found in other empirical studies of provincial growth in China. For instance Li, Liu, and Rebelo (1998) and Aziz and Duenwald (2001) find no evidence of a significant contribution of physical capital accumulation to provincial growth in China. Most of the previous studies do not introduce a proxy for human capital accumulation or use the secondary school enrolment, which is only a rough proxy for the stock of human capital in the provinces.[31] Although the share of population in the province with more

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[28] See Table 2.

[29] For more on the impact of China's open door policy see Lee (1994), Mody and Wang (1997), Chen and Feng (2000), and Demurger (2000).

[30] The ratio of exports and imports to GDP was also introduced but never appeared to be significant.

[31] Demurger (2001) uses the share of population with more than secondary schooling, which is calculated from the permanent inventory method.

than secondary schooling is a more accurate indicator, it may still suffer from measurement error. More generally, such indicators only capture the level of capital accumulation and do not provide information about the ability of the economy to allocate factors efficiently. In their analysis of the sources of economic growth in China, Wang and Yao (2001) find rapid human capital accumulation since 1952, and that both physical and human capital contributed to China's growth performance during the reform period. These authors also point out that given the rapid expansion of capital base, the relative importance of factor accumulation may be declining in favor of total factor productivity as the driving force for growth. Increasing total factor productivity depends on improving the allocation of factors by reforming the state and financial sector and allowing both capital and labor to move freely.[32]

Little evidence of conditional (or beta) convergence is found. As reported at the bottom of Tables 3a and 3b, the coefficient estimates of the lagged dependent variable are significantly smaller than unity only in four regressions. How can this weak result of conditional convergence be explained? First, because variables are averaged over two years, our estimates might capture both short-term (business cycles) and long-term (structural) variations. Second, the general consensus among studies of income per capita convergence among Chinese provinces is that the relative dispersion of income per capita has decreased over the 1980s and increased over the 1990s, while beta-convergence is significant over both periods.[33] However, forces of beta-convergence were stronger in the pre-1990 period and weaker in the 1990s. For instance, estimates over the whole reform period range from 4.3 to 7.5 percent per year. When the period starts in the late 1980s or early 1990s, the convergence coefficients range from 1.6 to 2.5 percent per year (see for instance Aziz and Duenwald 2001 and Dayal-Gulati and Hussain 2002). When significant, our estimates of GDP per capita convergence range at comparable levels, from 2.6 to 4.6 percent per year (bottom of Table 3a and 3b).

Finally, another reason for an absence of convergence may lie in the econometric technique. Quite surprisingly and despite the well-known inefficiency of OLS or within estimators for panel data when the lagged dependent variable is introduced among the regressors, few previous studies on growth empirics in China have relied on GMM estimators.[34] As Bond, Hoeffler, and Temple (2001) point out, using a OLS level estimator for AR(1) models gives an estimate of the lagged dependent variable biased upward in the presence of individual fixed effects, whereas within estimators give an

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[32] This conclusion is similar to the one of Easterly and Levine (2001) who find on a cross-section of countries that the level of investment is not as important as its quality, and that TFP accounts for most of the variation in output.

[33] See Aziz and Duenwald (2001) for a review of results on the convergence of provincial income per capita in China.

[34] One exception is the study of Aziz and Duenwald (2001), which implements the GMM-System methodology.

estimate biased downward in short panels. Therefore, finding out that the GMM estimate of the coefficient on the lagged dependent variable lies close to the corresponding within parameter estimate can be considered as a signal that biases due to weak instruments may be important. Tables 4a and 4b report the estimates using first-differenced GMM, Within Groups (Table 4a) and OLS (Table 4b) estimators, respectively. The estimates of the lagged dependent variable using a first-differenced GMM estimator are close to the corresponding within ones, which are likely to be biased downward in a short panel. In contrast, the estimate of the coefficient of the initial income using the GMM system lies well above the corresponding within and below the OLS estimates. Overall, the results suggest a bias problem caused by weak instruments in the first-differenced GMM estimates and by the correlation of the lagged dependent variable with the error term in the within estimates. Hence, the previous results on provincial growth convergence using within estimators most likely overstate the beta-convergence process between Chinese provinces.

We also try out alternative specifications in order to check the robustness of the results. First, we drop the investment rate from the set of control variables and estimate a reduced form of equation (1) where investment rate is implicitly supposed to be a function of the GDP growth rate. As mentioned earlier, the rate of investment is highly correlated with the schooling variable, so estimating the reduced form of the growth equation can help eliminate colinearities. The results in Table 5a are very close to results when the investment rate is part of the conditioning set of variables. Hence estimating the equation with or without investment does not seem to make a difference and colinearity is unlikely to be important, as the schooling variable remains insignificant even when the investment rate is left out of the regression.

Second, we introduce a coastal dummy among the regressors, the idea here being coastal provinces have been growing more rapidly and their banking sector is characterized by a lower share of SOB credit, less credit received by the central bank, and a more diversified banking sector. Hence introducing a coastal dummy checks for omitted variables that can create a spurious relation between the growth rate of per capita GDP and the indicators of financial intermediation. The results in Table 5b with a coastal dummy introduced remain similar to that without any dummy, supporting the view that the significance of the relations between the financial intermediation indicators and local growth performance does not come from any common feature of coastal areas not taken into account in the regression.

Finally, we estimate equation (1) over two five-years periods rather then five two-years periods in order to evaluate sensitivity to cyclical issues. Table 6 reports the estimate using successively within (fixed individual effects) and Generalized Least Squares (random individual effects) estimators. Both estimators lead to qualitatively

similar results for the financial indicators[35]: Size has either the "wrong" sign or is insignificant while SOB has a negative sign and is significant when fixed effects are used. CENTRAL is significantly negative while CONCENTRATION has a negative sign, although significant only in the GLS specification. Overall, using a longer period to avoid cyclical trends leads to similar results.

5. Conclusion

This paper examines the relationship between financial intermediation and local economic growth in China. It appears that because of capital market fragmentation, the unevenness in banking development is an important factor in local economic performance. We find that China's financial deepening, as exceptional as it is, does not contribute to local economic performance, as shown by the insignificance of the ratio of deposits to GDP. Furthermore, the banking sector's continued support of loss-making state-sector enterprises over non-state enterprises is reflected in the negative impact of state and central-bank lending on economic growth. More precisely, the negative impact of state-bank credit is not a matter of financial performance per se, but more the result of the burden of supporting the state-owned sector. Indeed, when we control for the state corporate size in the local economy, the state banks' negative impact on growth ceases to be significant. This finding suggests that improving state bank performance and more generally financial resource allocation would necessitate first reforming the state corporate sector and improving the economic climate at the local level. Another important result with policy implications is that provinces with a more diversified banking sector have performed better in terms of economic growth. In the short term, it would be advisable for China to relax restrictions on entry into the banking sector in order to prepare the economy for the strong competitive pressures likely to come from foreign banks with China's accession to the WTO.

Finally, traditional determinants of economic growth do not appear to explain local economic growth in China over the 1990s. For instance, foreign direct and domestic investments are insignificant most of the time. Another example is the somewhat worrisome no-convergence result of per capita income over the period. Poorer provinces do not catch up to richer ones, even after controlling for a set of conditioning factors. While part of the reason for these unconventional results may be the period under study or the short panel dimension, a more important explanation lies in the econometric technique. The GMM-System estimator that we use provides efficient estimates for empirical growth models, while standard estimators used in previous studies are

[35] The two estimates lead, however, to very different results regarding the set control variables: the initial income per capita variable becomes insignificant when the within estimator is uses, suggesting that the fixed individual effects capture the convergence effect. Similarly, the share of non-state production is insignificant. Overall, this suggests that these variables may not vary enough to remain significant in the presence of fixed provincial effects.

inefficient for panel autoregressive models. Moreover, GMM-system estimators also outperform the first generation GMM-estimators when the time-series is persistent as is typically the case in economic growth models.

References

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

Arellano, M., and S. Bond. 1991. "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an application to employment equations." *Review of Economic Studies* 58: 277-297,

Aziz, J., and C. Duenwald. 2001. "China Provincial Growth Dynamics." *WUSTL Economics Working Paper-Development and Comp Systems*, 12004,

Barro, R. J., and X. Sala-i-Martin. 1992. "Convergence." *Journal of Political Economy* 100(2): 223-51.

Bayoumi T. A. and A. K. Rose. 1993. "Domestic Savings and Intra-National Capital Flows." *European Economic Review Review* 37: 1197-1202.

Beck, T., A. Demirgüç-Kunt, and R. Levine. 2000. "A New Database on the Structure and Development of the Financial Sector." *World Bank Economic Review* 14(3): 597-605.

Blundell, R., and S. Bond. 1998. "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models." *Journal of Econometrics* 87(1): 115-43.

Bond, S., A. Hoeffer, and J. Temple. 2001. "GMM estimation of Empirical Growth Models." Economics Group Papers W21, Nuffield College, University of Oxford.

Boyreau-Debray, G., and S.J. Wei, 2002, "How Fragmented is the Capital Market in China?", presented at the Chinese Economic Society Conference, "The Integration of the Greater Chinese Economies: Causes, Consequences, and Implications", Hong Kong, June26th-28th.

Carkovi M. and R. Levine, 2002, "Does Financial Investment Accelerate Economic Growth?", Working Paper presented at the Center for Financial Studies and World Bank Joint Conference, May 30-31, Washington DC.

Cetorelli, N., and M. Gambera. 2001. "Banking Market Structure, Financial Dependence and Growth: International Evidence from Industry Data." *Journal of Finance* 56(2, April): 617-48.

Chen, B., and Y. Feng. 2000. "Determinants of Economic Growth in China: Private Enterprise, Education and Openness." *China Economic Review* 11(1): 1-15.

Chen, J., and B. M. Fleisher. 1996. "Regional Income Inequality and Economic Growth in China." *Journal of Comparative Economics* 22: 141-64.

Cull, R., M. Shen, and L. C. Xu. 2002. "How much is Lack of Finance Holding Back China's Interior Provinces." World Bank, Washington, D.C. Processed.

Dayal-Gulati, A. and A. M. Husain. 2002. "Centripetal Forces in China's Economic Takeoff." *IMF Staff Papers* 42(3): 364-94.

Dekle, R. 1996. "Saving-Investment Associations and Capital Mobility: On the Evidence from Japanese Data." *Journal of International Economics* 41: 53-72.

Demurger S., J. D. Sachs , W. T .Woo, S. Bao, G. Chang, and A. Mellinger. (2002). "Geography, Economic Policy, and Regional Development in China." *NBER Working Paper* 8897, April.

Demurger, S. 2000. *Economic Opening and Growth in China.* Paris: OECD Development Center Studies.

Demurger, S. 2001, "Infrastructure Development and Economic Growth: An Explanation of Regional Disparities in China." *Journal of Comparative Economics* 29: 95-117.

Easterly W. and R. Levine; 2001, "It's not Factor Accumulation: Stylized Facts and Growth Models", *World Bank Economic Review*, 15(2):177-219.

Feldstein, M., and C. Horioka. 1980. "Domestic Savings and International Capital Flows." *Economic Journal* 90: 314-29.

Friedman, M. 1957. "Discussion of the Inflationary Gap." In *Essays in Positive Economics.* Chicago : Univ. Chicago Press.

Hanson, McPherson S. and C. Waller. 2000. "Do Local Banks Matter for the Local Economy ? In Search of a Regional Credit Channel." In G. D. Hess and E. van Wincoop, eds., *Intranational Macroeconomics.* Cambridge University Press.

Huang, H., and Y. Qian. 2001. "Financial Stability and Development in China after the WTO accession." University of California, Berkeley. Processed.

Im, K., M.. Pesaran H, and Y. Shin. 1995. "Testing for Unit Roots in Heterogenous Panels." Working Paper 9526 (June). Department of Applied Economics, University of Cambridge.

Iwamoto, Y., and E. van Wincoop. 2000. "Do Borders Matter? Evidence from Japanese Regional Net Capital Inflows." *International Economic* 41 (1, February) : 241-69.

Jian, T., J. D. Sachs, and A. M. Warner. 1996. "Trends in Regional Inequality in China." *NBER Working Paper* 5412. National Bureau of Economic Research, Cambridge, Mass.

Kornai, J. 1980. *Economics of Shortage.* Amsterdam: North-Holland.

Kraay, A. 2000. "Household Saving in China." *World Bank Economic Review* 14(3, September): 545-70.

Lardy, N. 1998. *China's Unfinished Economic Revolution.* Brookings Institution Press.

Lee, J. 1994. "Regional Differences in the Impact of Open Door Policy on Income Growth in China." *Journal of Economic Development* 19(1): 215-34.

Levine, R. 1997. "Financial Development and Economic Growth: Views and Agenda." *Journal of Economic Literature* 35(2): 688-726.

Levine, R., N. Loayza, and T. Beck. 1999. "Financial Intermediation and Growth. Causality and Causes." *World Bank Country Economics Department Papers* 2059. Washington, D.C.

Li, H., Z. Liu, and I. Rebelo. 1998. "Testing the Neoclassical Theory of Economic Growth: Evidence form the Chinese Provinces." *Economics of Planning* 31: 117-32.

Li, K., and T. Liu. 2001. "Impact of Financial Resources Liberalization in China's Economic Growth: Provincial Evidence." *Journal of Asian Economics* 12(2): 245-62.

Mankiw, N. G., D. Romer, and D. Weil. 1992. "A Contribution to the Empirics of Economic Growth." *Quarterly Journal of Economics* 107(2): 407-37.

Maskin, E., and C. Xu. 2001. "Soft Budget Constraint Theories." *Economics of Transition* 9(1) :1-27.

Mody, A., and F. Wang. 1997. "Explaining Industrial Growth in Coastal China: Economic Reforms... and What Else?." *World Bank Economic Review* 11(2): 293-325.

Neely, M., and D. Wheelock. 1997. "Why does bank performance vary across states?" *Review/Federal Reserve Bank of St. Louis* 79(2):27-41.

Park, A., and K. Sehrt. 2001. "Tests of Financial Intermediation and Banking Reform in China." *Journal of Comparative Economics* 29(4, December):608-44.

Poncet, S. 2002. "Is China Disintegrating? The Magnitude of Chinese Provinces' Domestic and International Integration." *CERDI Etudes et Documents* 5.

Qian, Y., and C. Xu. 1993. "Why China's Economic Reform Differ : the M-form Hierarchy and Entry/Expansion of the Non-State Sector." *The Economics of Transition* 1(2): 135-70.

Raiser, M. 1998. "Subsidising Inequality: Economic Reforms, Fiscal Transfers and Convergence Across Chinese Provinces." *Journal of Development Studies* 34(3): 1-26.

Samolyk, K. A. 1994. "Banking Conditions and Regional Economic Performance." *Journal of Monetary Economics* 34: 259-78.

Sinn, S. 1992. "Saving-Investment Correlations and Capital Mobility: On the Evidence from Annual Data." *The Economic Journal* 102: 1062-1170.

Thomas, A. H. 1993. "Saving, Investment and the Regional Current-Account: An Analysis of Canadian, British, and German Regions." *IMF Working Paper* 93/62. International Monetary Fund, Washington, D.C.

Wang, Y., and Y. Yao. 2001. "Sources of China's Economic Growth. 1952–99: Incorporating Human Capital Accumulation." Policy Research Working Paper 2650. World Bank, Development Research Group, Washington, D.C.

World Bank. 1994. *China: Internal Market Development and Regulation.* Washington D.C.: World Bank.

Yamori, N. 1995. "The Relationship Between Domestic Savings and Investment: The Feldstein-Horioka Test Using Japanese Regional Data." *Economic Letters* 48:61-66.

Appendix: definition of the variables and statistical sources

Variable definition

- GDP per capita: logarithm of real GDP per capita.
- Investment rate: ratio of fixed investment to GDP.
- Schooling: share of population with more than secondary schooling.
- Non-state production: Share of non-state gross industrial output value in total gross industrial output value.
- Fdi: ratio of foreign direct investment to GDP.
- SIZE: ratio of total deposits of the banking system to GDP.
- SOB: ratio of total state-owned bank credit to GDP.
- CENTRAL: ratio of loans to deposits of the state-owned banks.
- CONCENTRATION: Herfindahl index of banking deposit concentration ($H_{i,t}$).

$$H_{i,t} = \sum_{j=1}^{n} \left(S_{j,i,t} \Big/ \sum_{j=1}^{n} S_{j,i,t} \right)^2$$

Where $S_{j,i,t}$ is the sum of deposits for bank j, i the province, t the period, and n the number of banks.

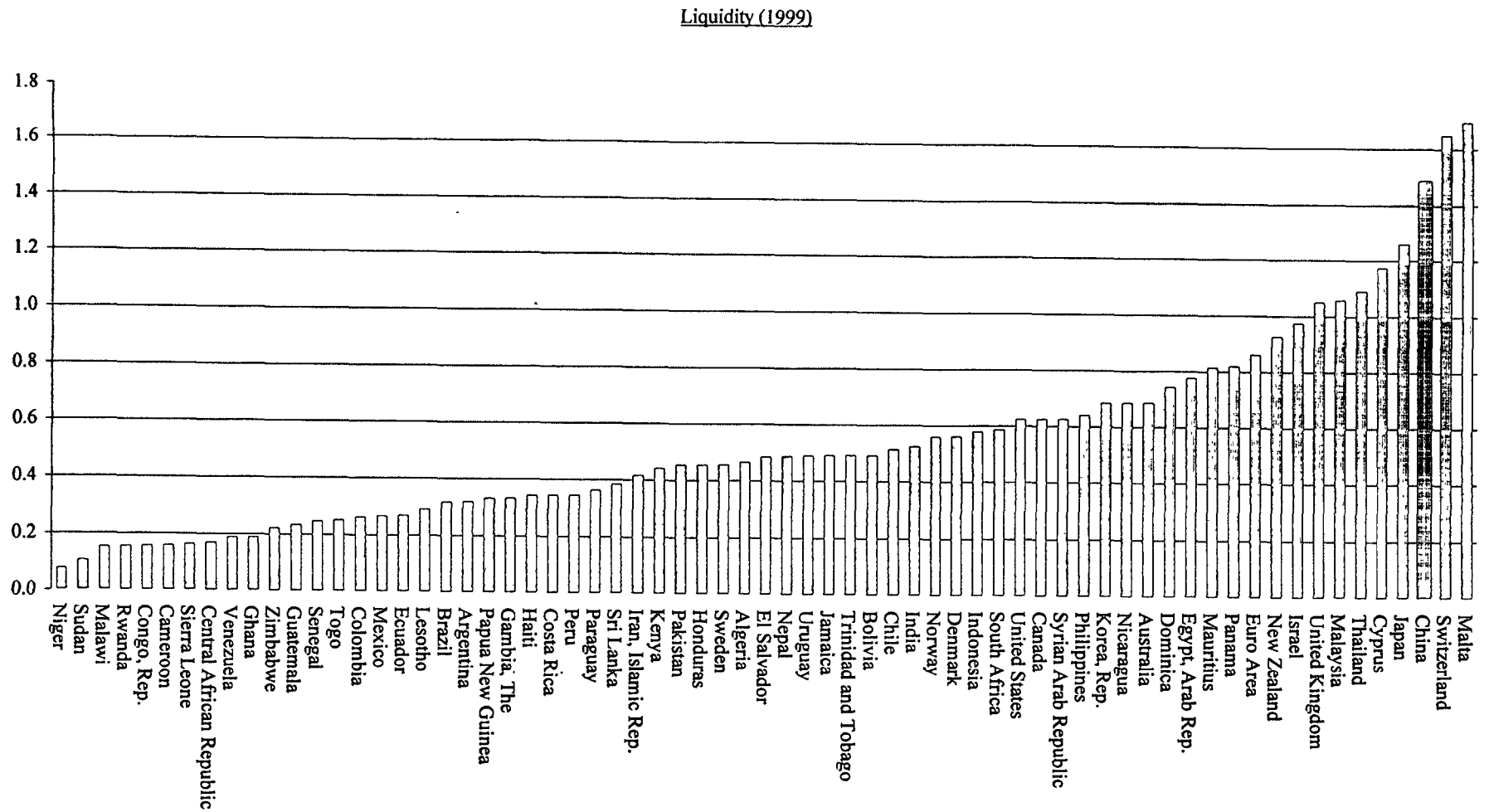
List of provinces and municipalities

Beijing, Tianjin, Hebei, Shanxi, Nei Mongolia, Liaoning, Jilin, Heilongjiang, Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Hainan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Sichuan+Chongqing.

Statistical sources

- State Statistical Bureau, various years, *Almanac of China Foreign Relations and Trade*, China Economics Publishing House.
- Research and Statistics Department of the People's Bank of China, various years, Almanac of China Finance and Banking, Chinese version, People's China Publishing House, Beijing.
- State Statistical Bureau, various years, China Statistical Yearbook, China Statistical Bureau, Beijing.
- State Statistical Bureau, 1996, China Regional Economy, a profile of 17 years of reform and opening-up, China Statistical Bureau, Beijing,
- A11 China Marketing Research, 2001, 1949-1999 China Statistical Data Compilation, China Statistical Bureau, Beijing.

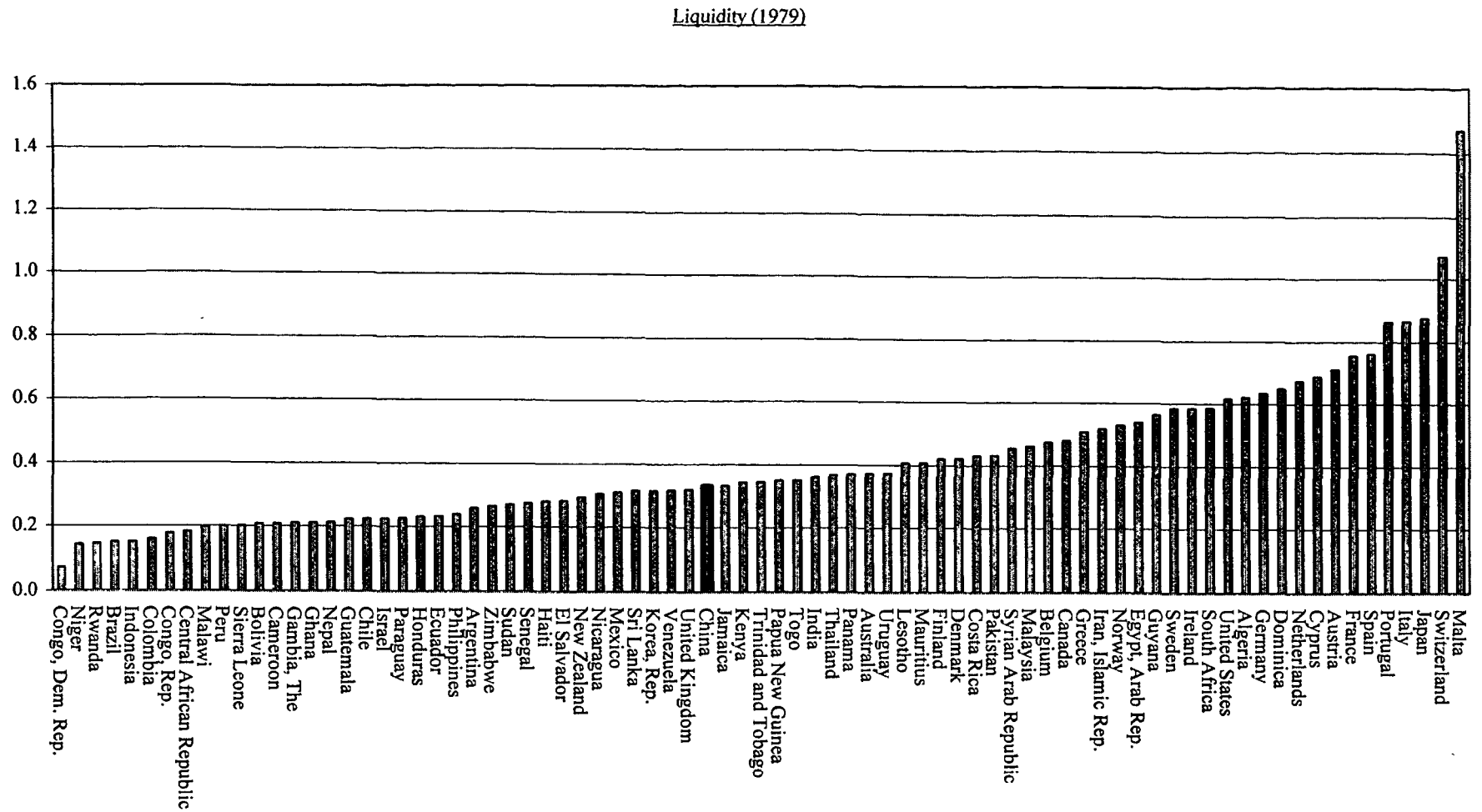
Figure 1a: Liquidity Rate – International Sample (1999)



The sample is composed of China and the 78 countries of the World Bank dataset of financial development indicators (see Beck, Demirgüç-Kunt, and Levine 2000). The liquidity rate is calculated as the ratio of liquid liabilities (line 55l) to GDP (line 99b).

Source: International Financial Statistics, IMF.

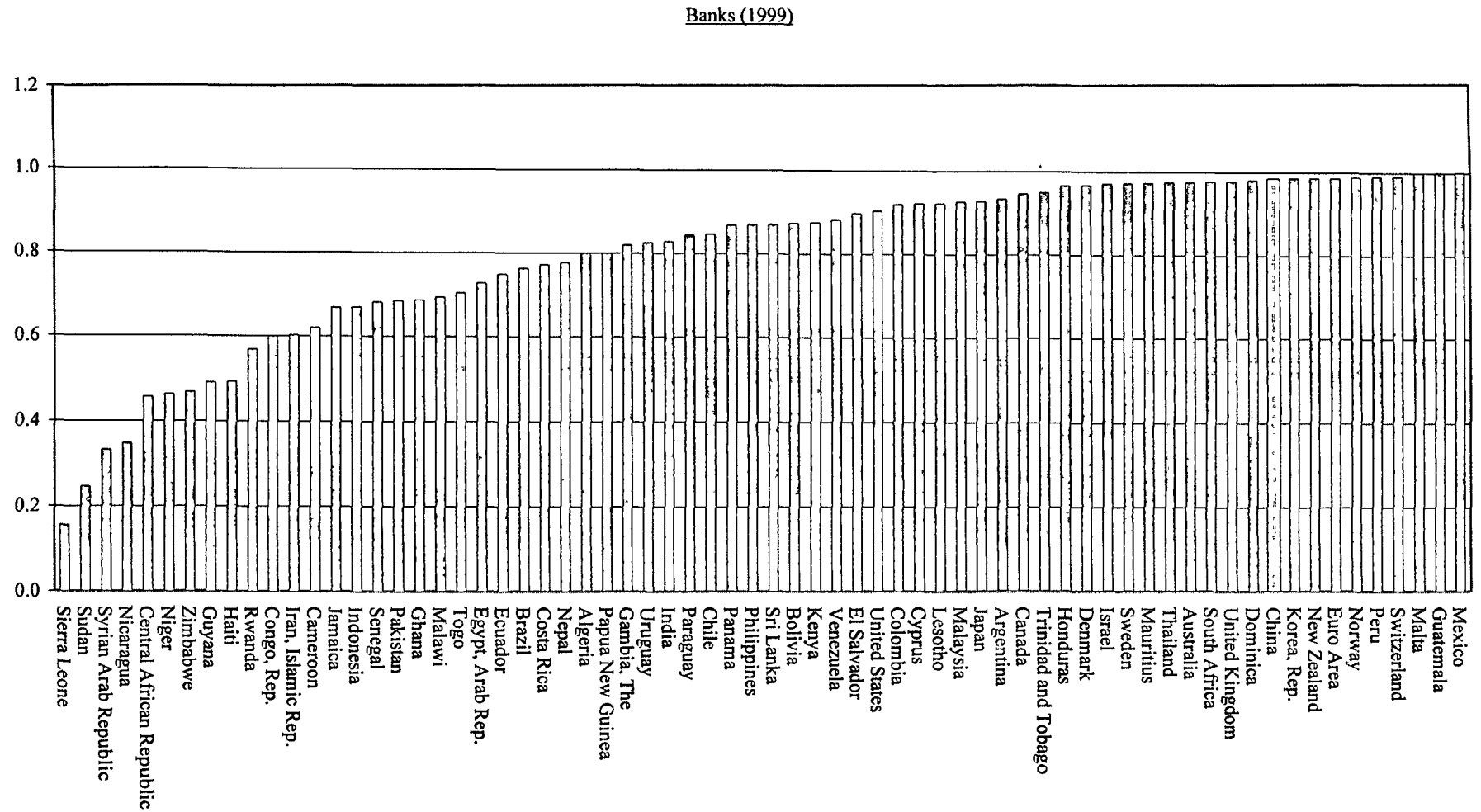
Figure 1b: Liquidity Rate – International Sample (1979)



The sample is composed of China and the 78 countries of the World Bank dataset of financial development indicators (see Beck, Demirgüç-Kunt, and Levine 2000). Liquidity is calculated as the ratio of liquid liabilities (line 55l) to GDP (line 99b).

Source: International Financial Statistics, IMF.

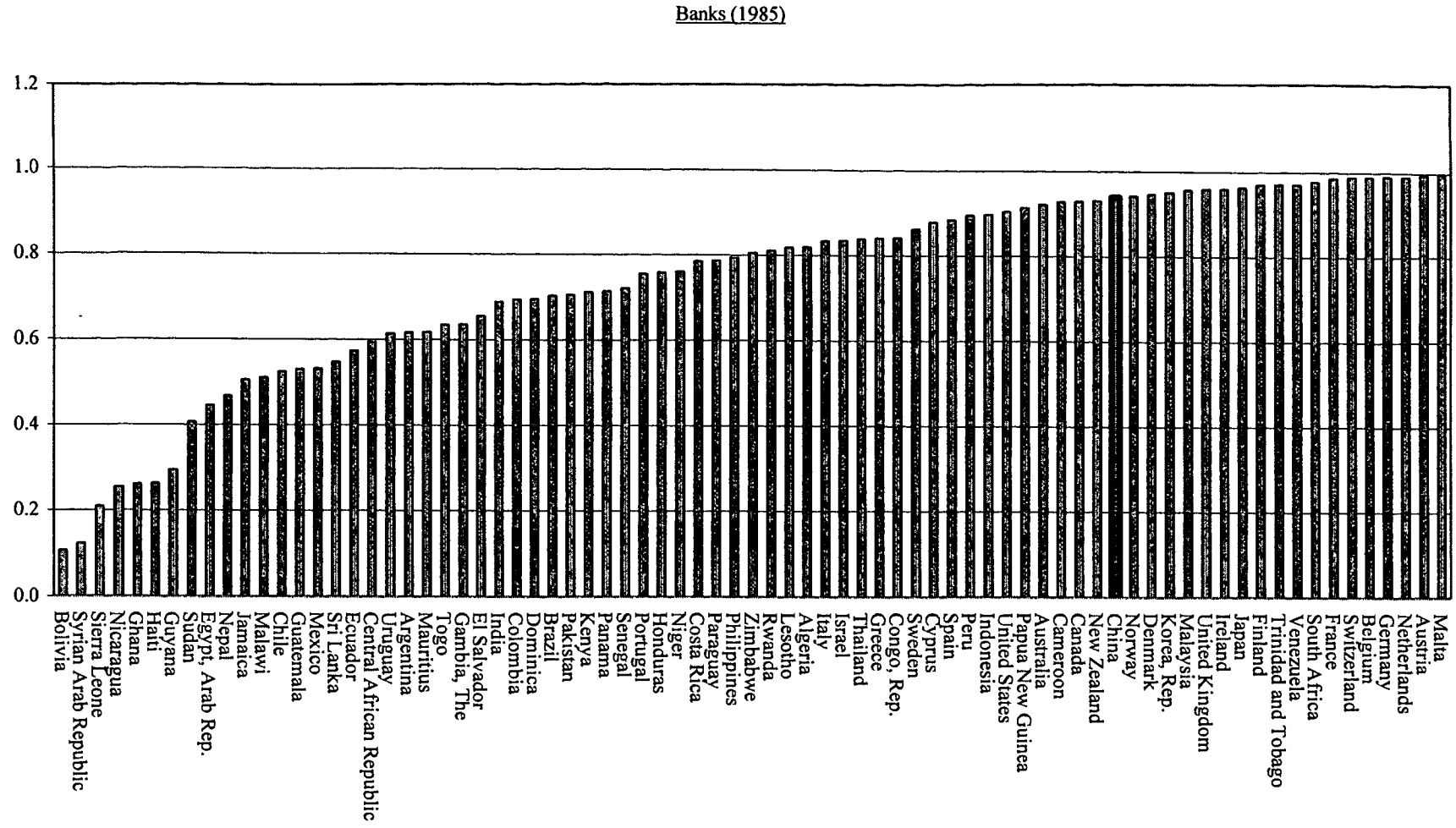
Figure 2a: Commercial-Central Bank – International Sample (1999)



The sample is composed of China and the 78 countries of the World Bank dataset of financial development indicators (see Beck, Demirgüç-Kunt, and Levine 2000). Commercial-Central is calculated as the ratio of assets of deposit money banks (lines 22a-d) to GDP (line 99b).

Source: International Financial Statistics, IMF.

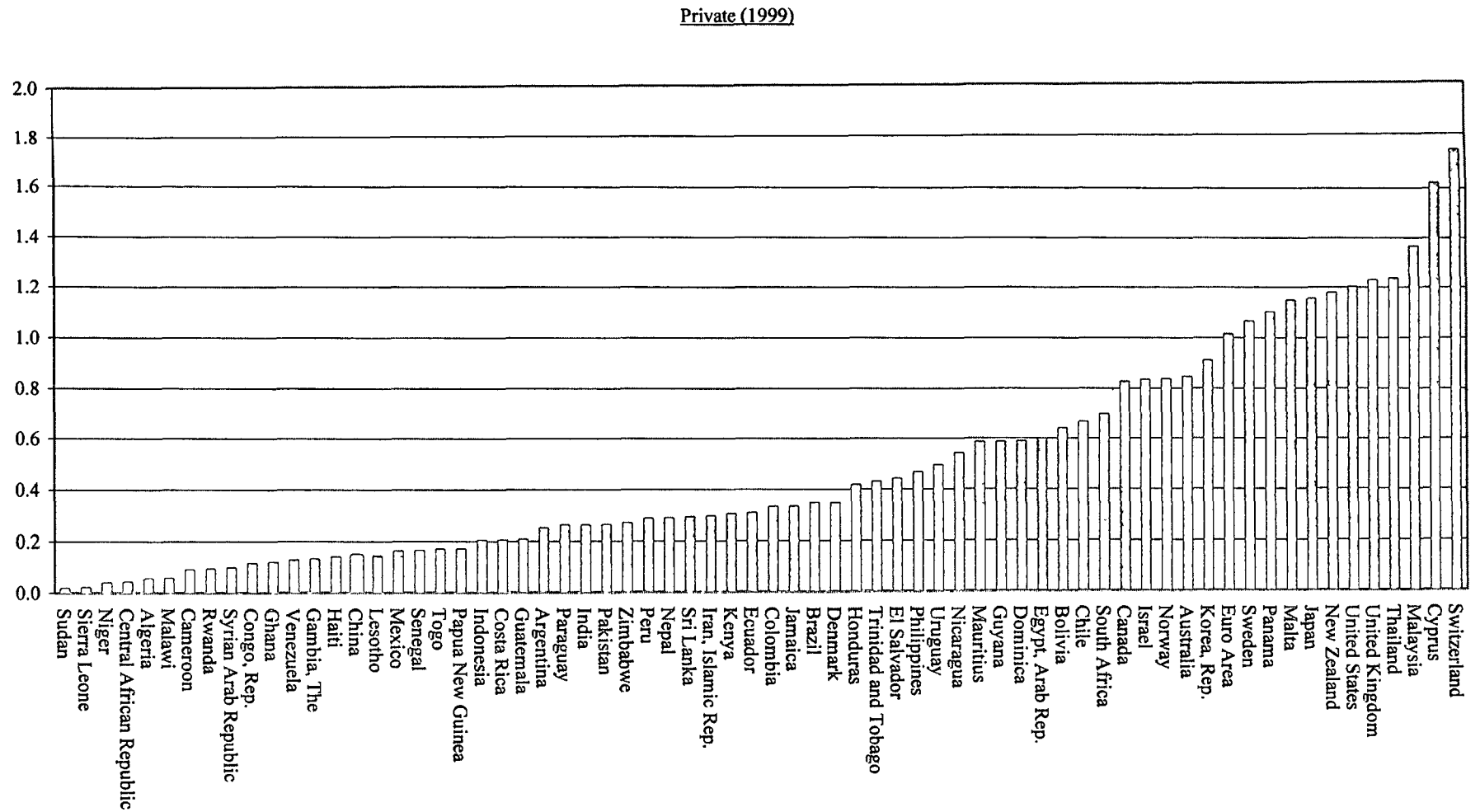
Figure 2b: Commercial-Central Bank – International Sample (1985)



The sample is composed of China and the 78 countries of the World Bank dataset of financial development indicators (see Beck, Demirgüç-Kunt, and Levine 2000). Commercial-Central Bank is calculated as the ratio of assets of deposit money banks (lines 22a-d) to GDP (line 99b).

Source: International Financial Statistics, IMF.

Figure 3a: Private Credit – International Sample (1999)



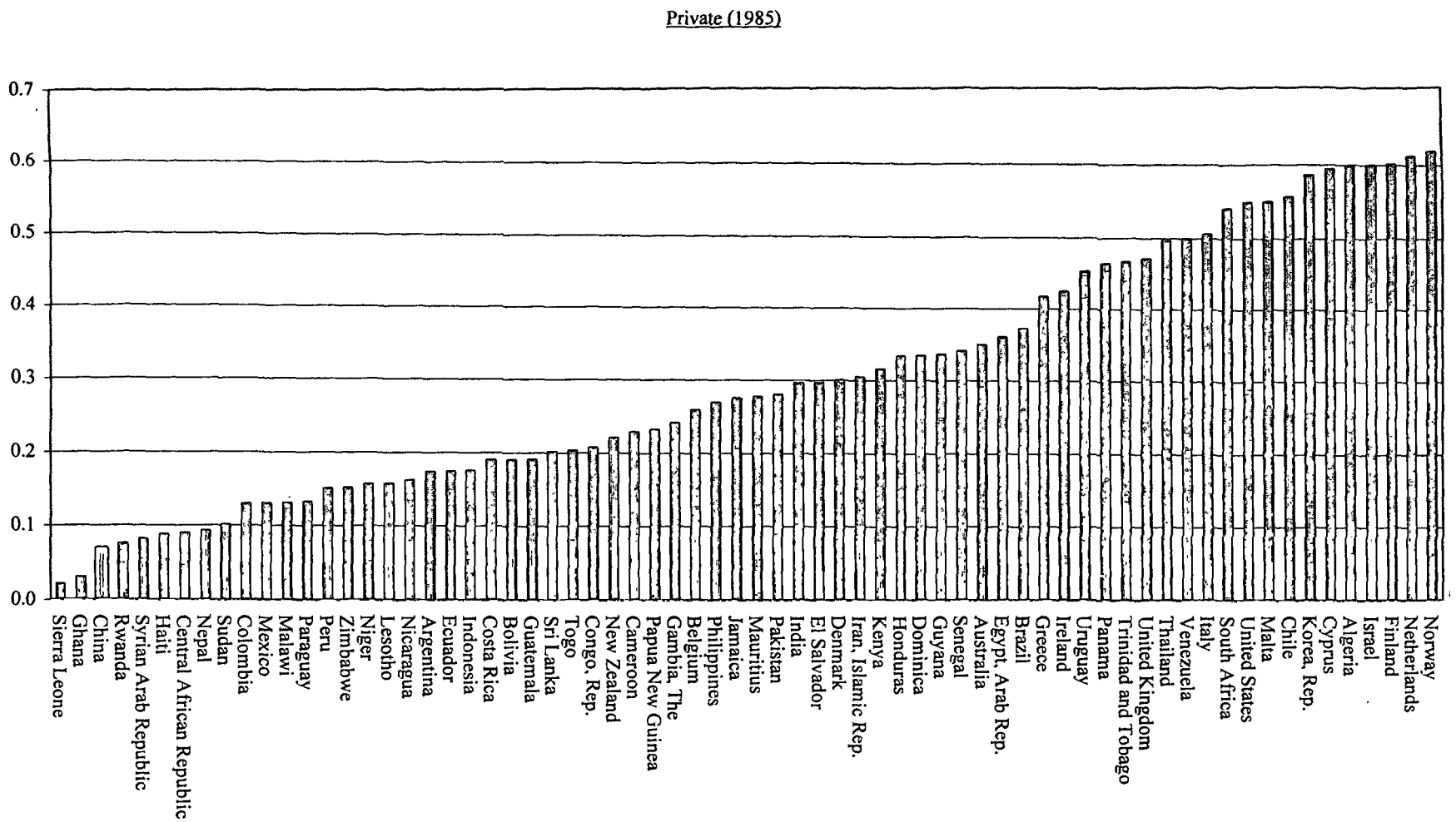
The sample is composed of China and the 78 countries of the World Bank dataset of financial development indicators (see Beck, Demirgüç-Kunt, and Levine 2000).

Private Credit is calculated as the ratio of credit by deposit money banks and other financial institutions to the private sector (lines 22d + 42d) to GDP (line 99b).

For China, Private credit is calculated using an estimate of the share of total credit directed to state enterprises of 90% in 1985 and 77.5% in 1999 (from Economic Intelligence Unit, February 18, 2002, "China: Grossly Distorted Product.").

Source: International Financial Statistics, IMF.

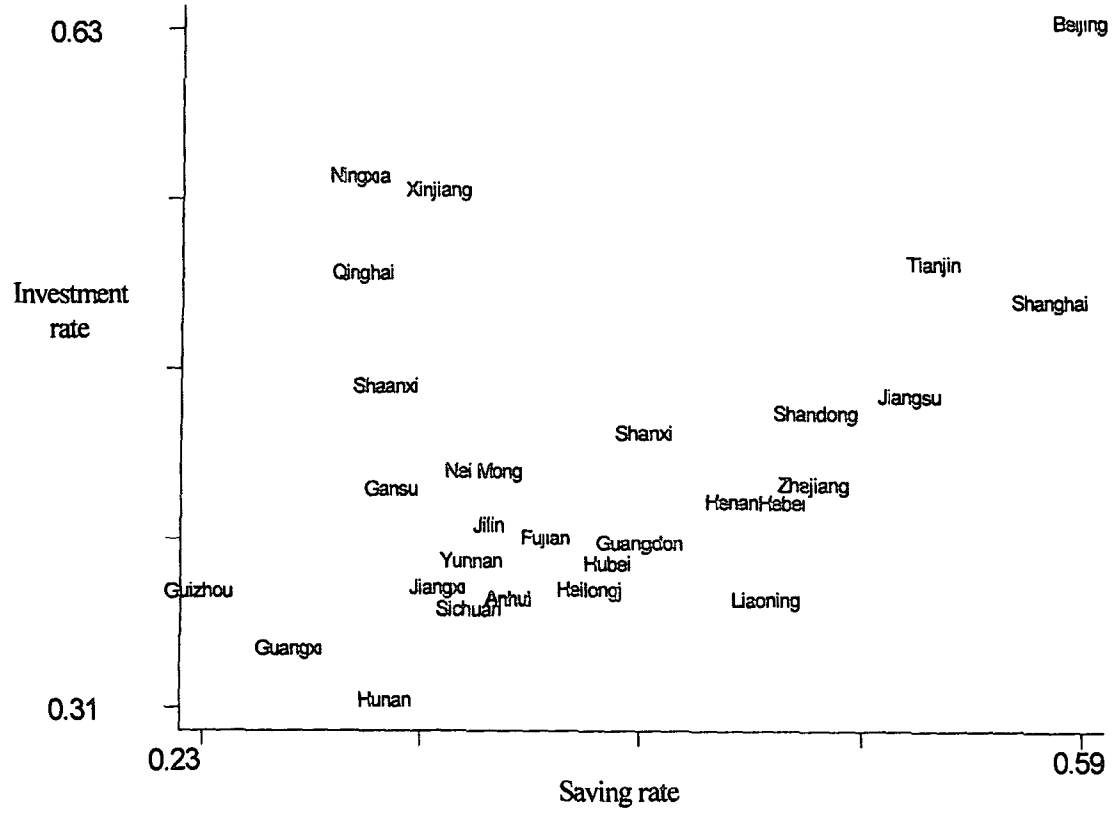
Figure 3b: Private Credit – International Sample (1985)



The sample is composed of China and the 78 countries of the World Bank dataset of financial development indicators (see Beck, Demirgüç-Kunt, and Levine 2000).
Private Credit is calculated as the ratio of credit by deposit money banks and other financial institutions to the private sector (lines 22d + 42d) to GDP (line 99b)
For China, Private credit is calculated using an estimate of the share of total credit directed to state enterprises of 90% in 1985 and 77.5% in 1999.
Source: International Financial Statistics, IMF.

Figure 4: Provincial Investment and Saving Rates

(Chinese provinces, 1985-2000, average values)



Variable definition:

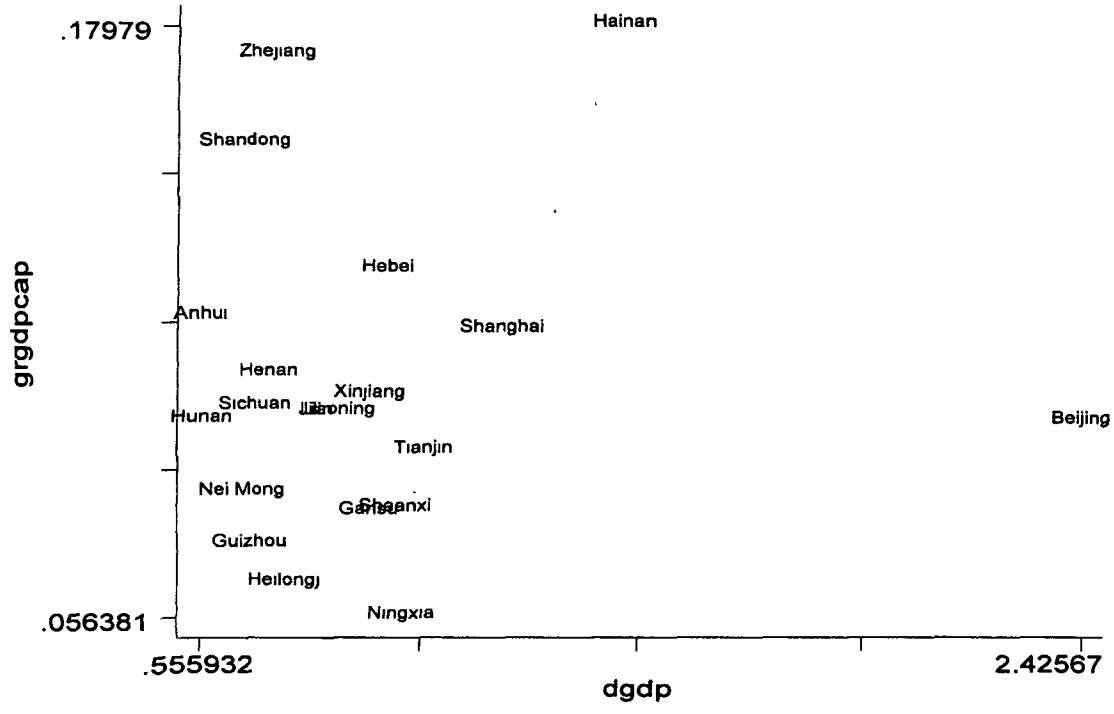
Investment rate: share of gross capital formation in GDP

Saving rate: ratio of GDP minus total consumption to GDP.

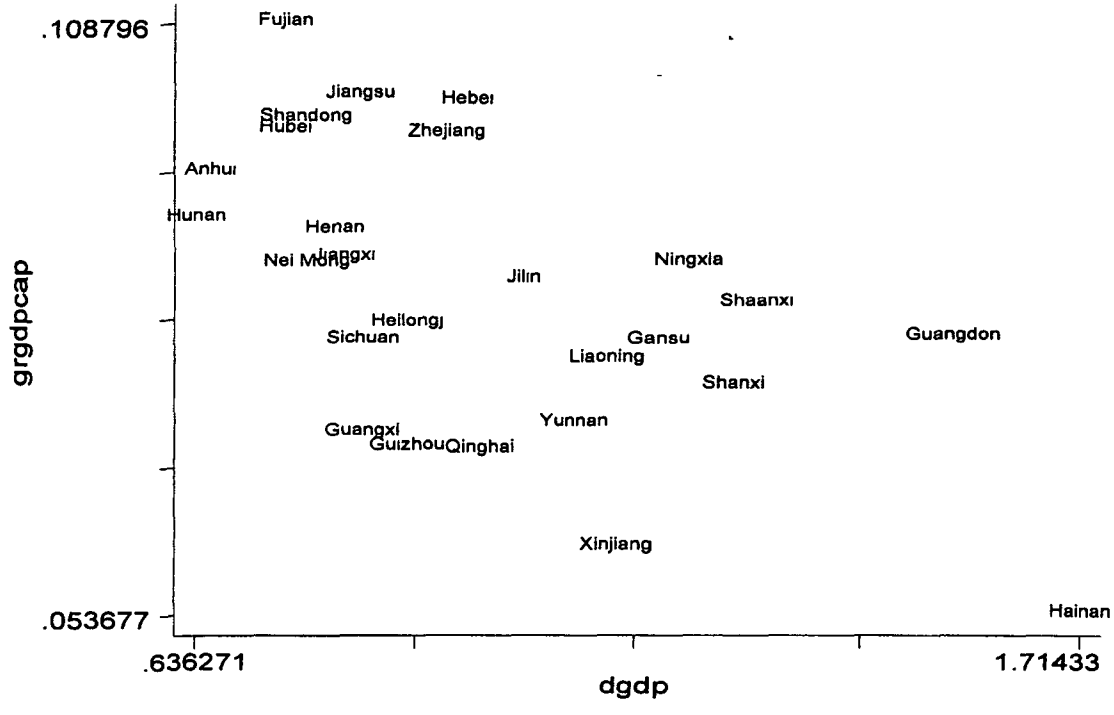
Source: All China Marketing Research, 2001, *1949-1999 China Statistical Data Compilation*, China Statistical Bureau, Beijing. China Statistical Yearbook, 2001, China Statistical Bureau, Beijing.

Figure 5.1a: Size and Real Growth of per Capita GDP (1990-1994, average values)

Full Sample



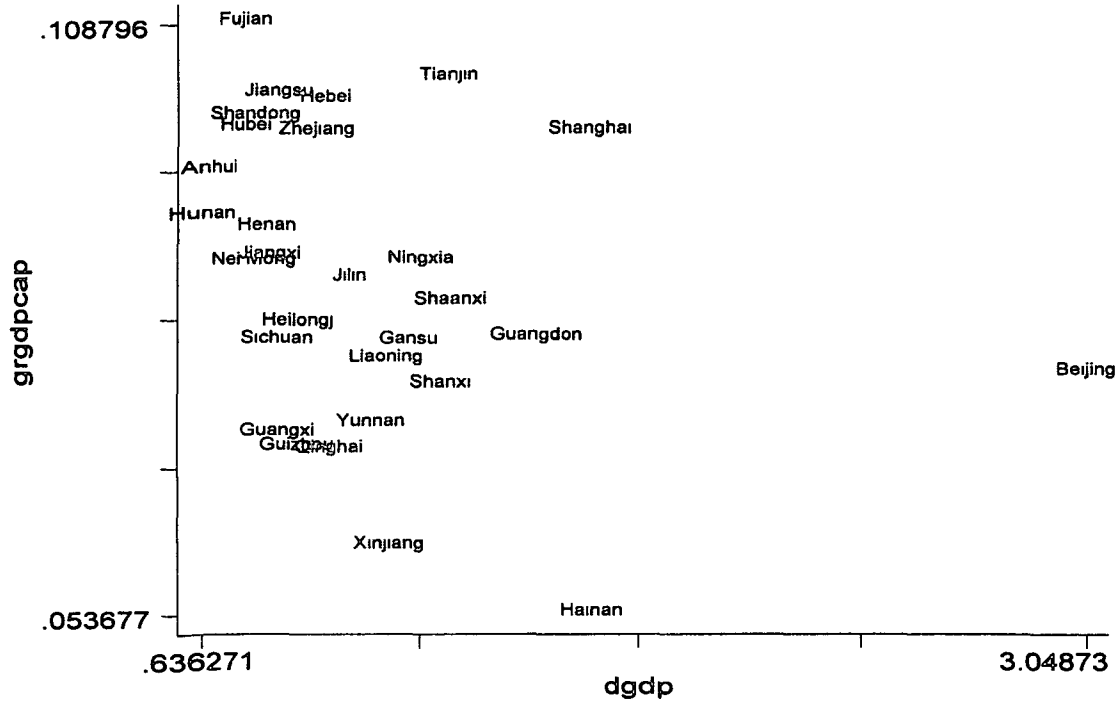
Restricted Sample (without the three municipalities of Beijing, Tianjin and Shanghai)



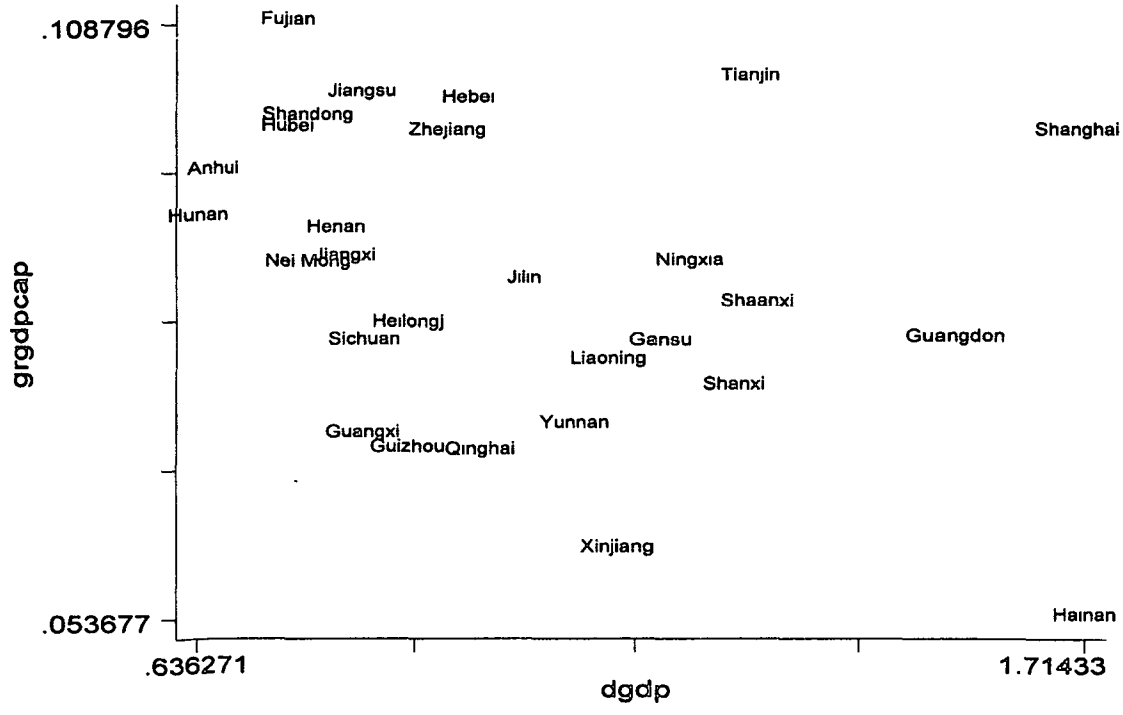
Source: China Statistical Yearbook, Almanac of China Finance and Banking (various issues).

Figure 5.2a: Size and Real Growth of per Capita GDP (1995-1999, average values)

Full Sample



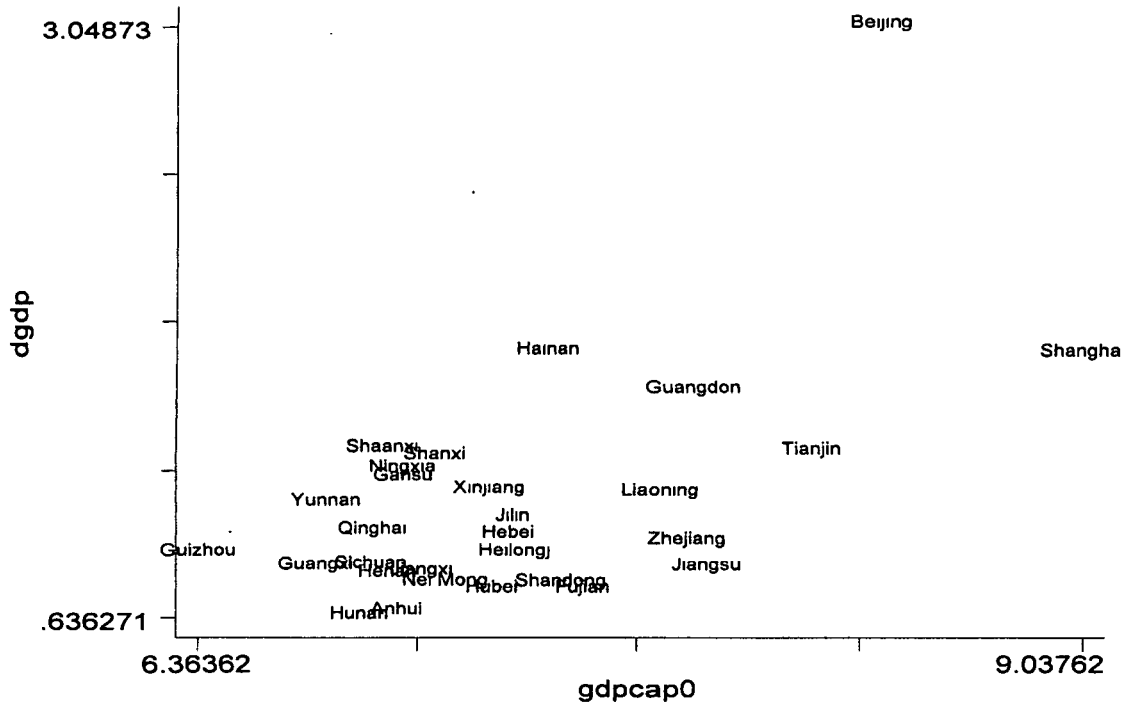
Restricted Sample (without the municipality of Beijing)



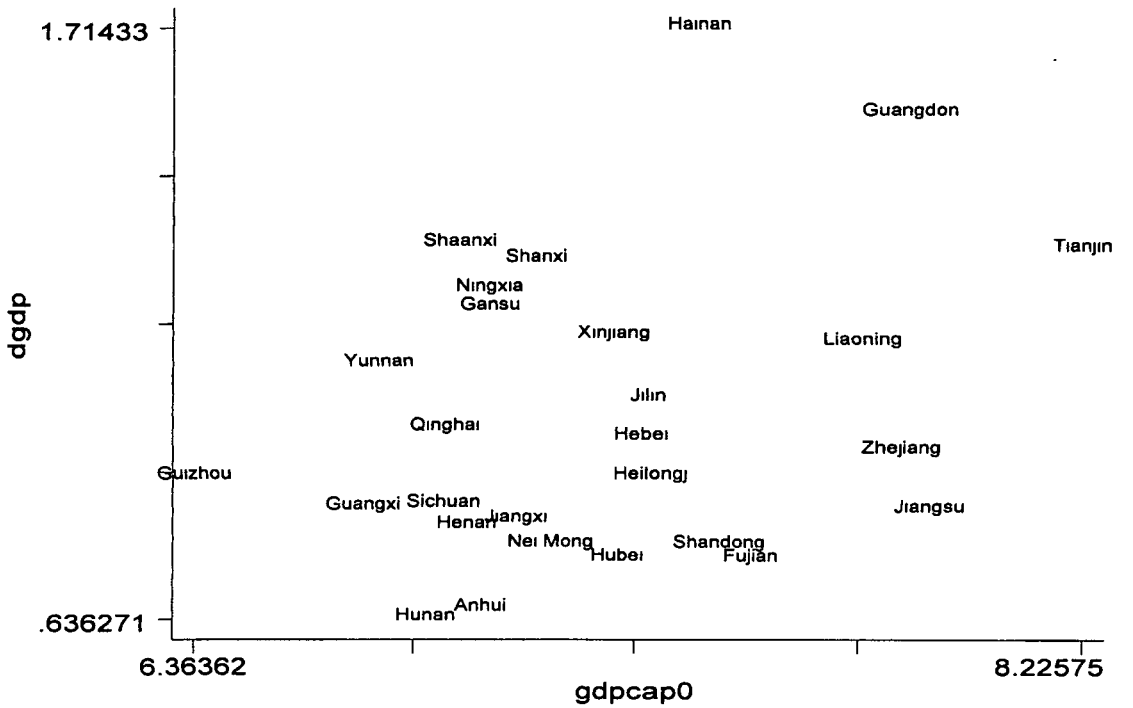
Source: China Statistical Yearbook, Almanac of China Finance and Banking (various issues).

Figure 5.1b: Size and Initial Level of Capita GDP -(1995-1999, average values)

Full Sample



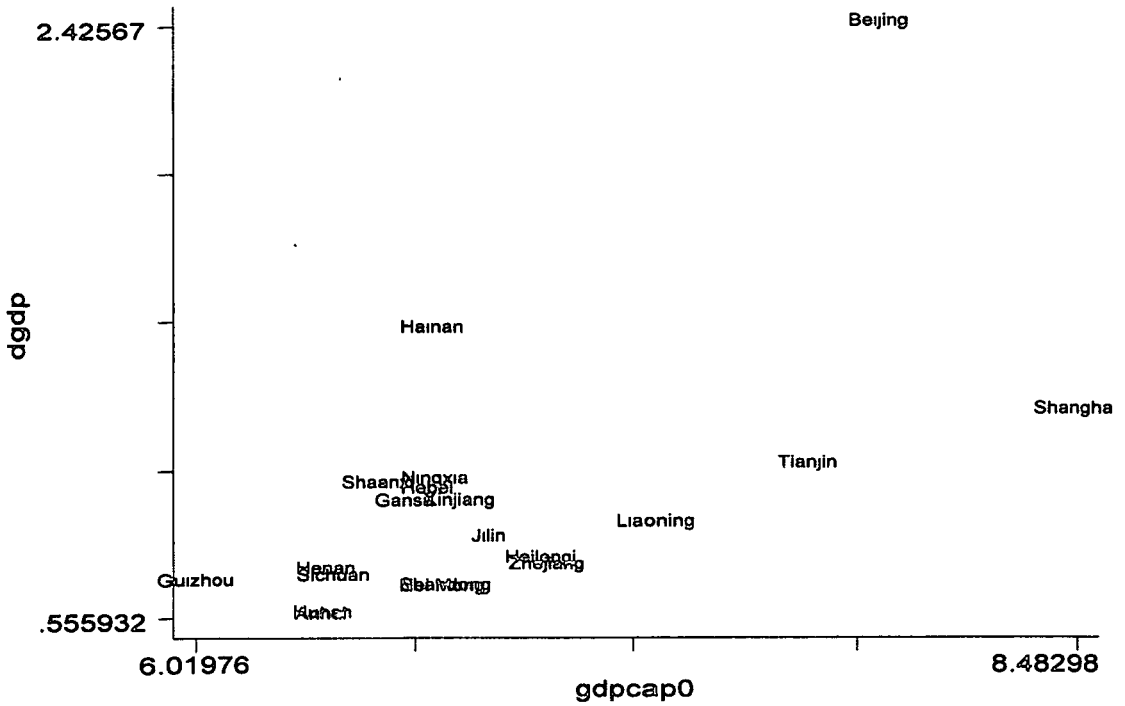
Restricted Sample (without the three municipalities of Beijing, Tianjin and Shanghai)



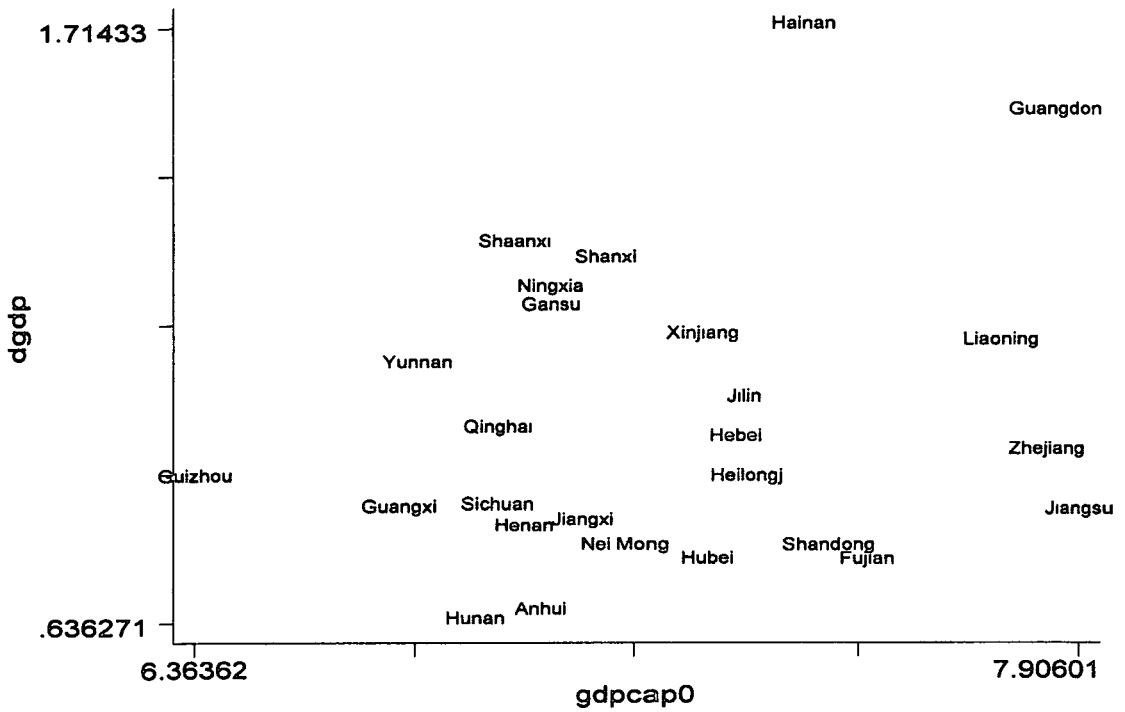
Source: China Statistical Yearbook, Almanac of China Finance and Banking (various issues).

Figure 5.2b: Size and Initial Level of Capita GDP (1990-1994, average values)

Full Sample



Restricted Sample (without the three municipalities of Beijing, Tianjin and Shanghai)

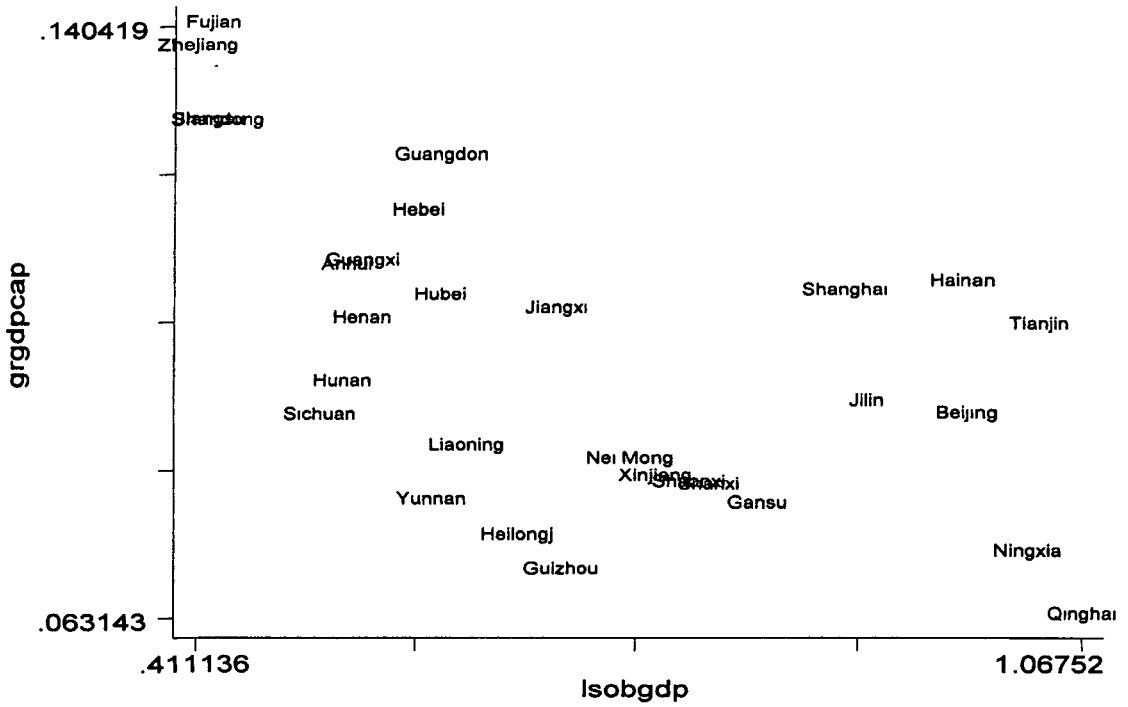


Source: China Statistical Yearbook, Almanac of China Finance and Banking (various issues).

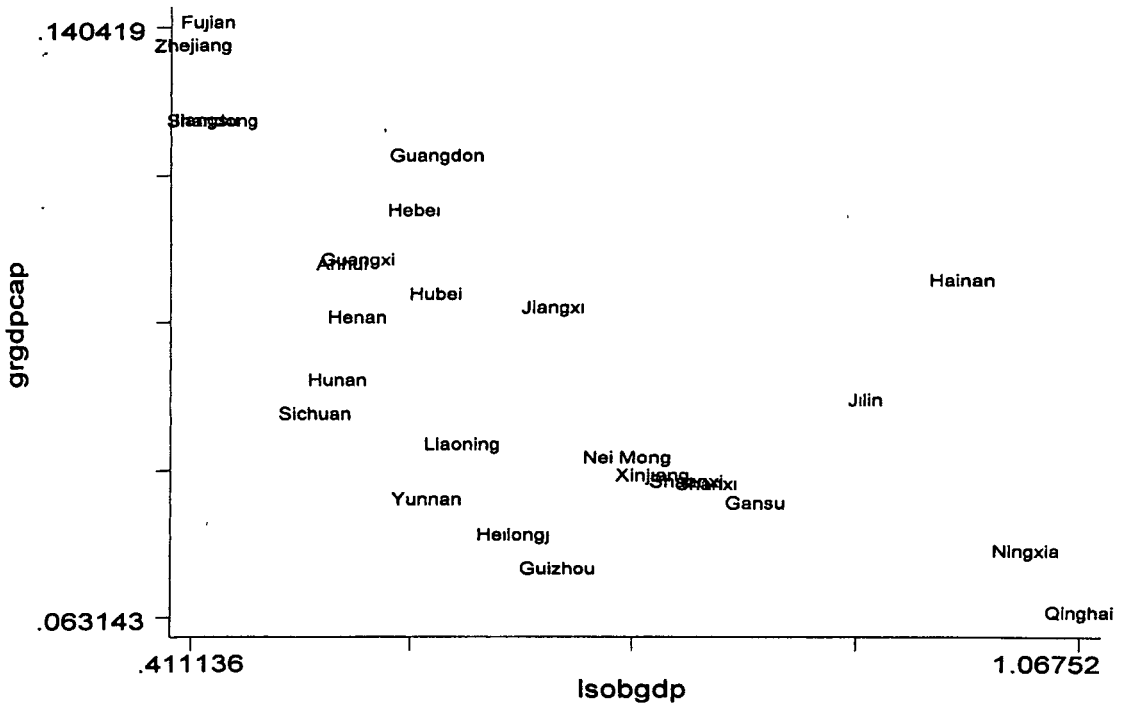
Figure 6a: Sob and Real Growth of per Capita GDP

(full sample, 1990-1999, average values)

Full Sample



Restricted Sample (without the three municipalities of Beijing, Tianjin and Shanghai)

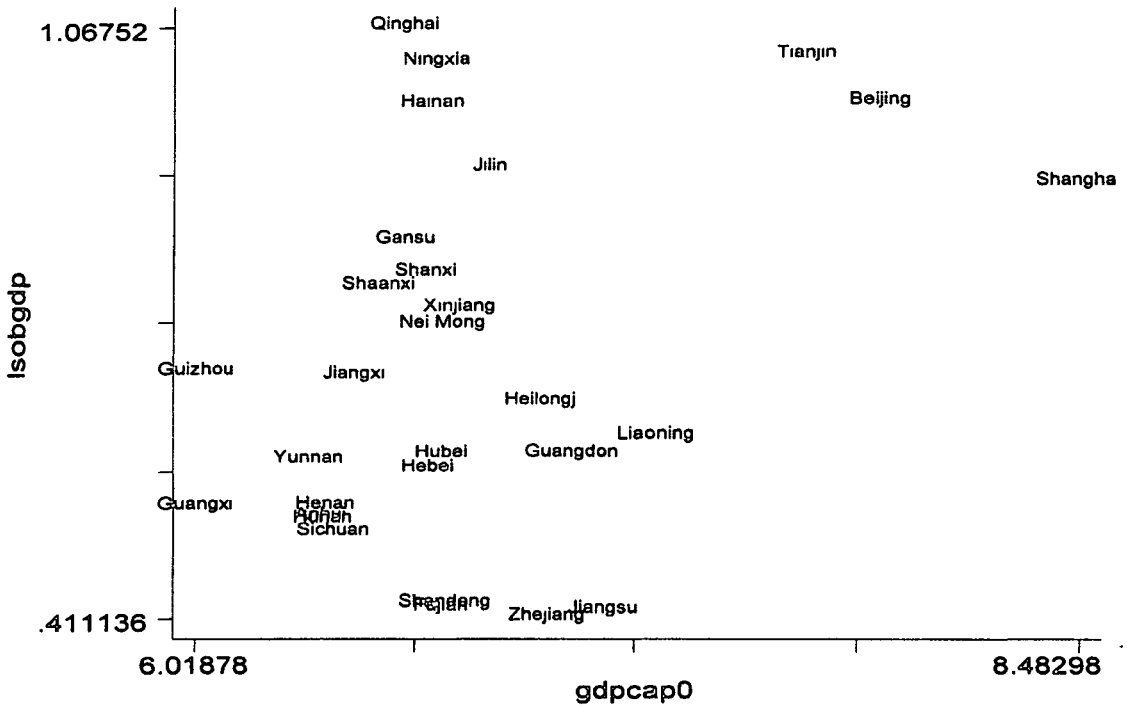


Source: China Statistical Yearbook, Almanac of China Finance and Banking (various issues).

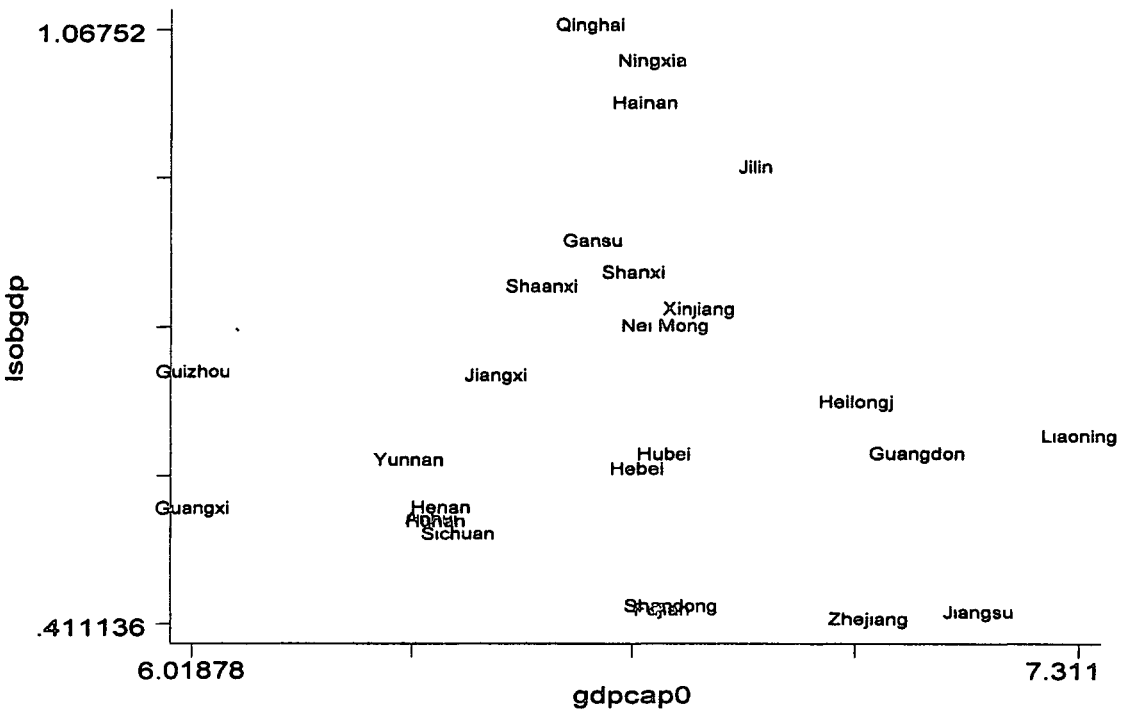
Figure 6b: Sob and Initial Level of Capita GDP

(restricted sample, 1990-1999, average values)

Full Sample



Restricted Sample (without the three municipalities of Beijing, Tianjin and Shanghai)

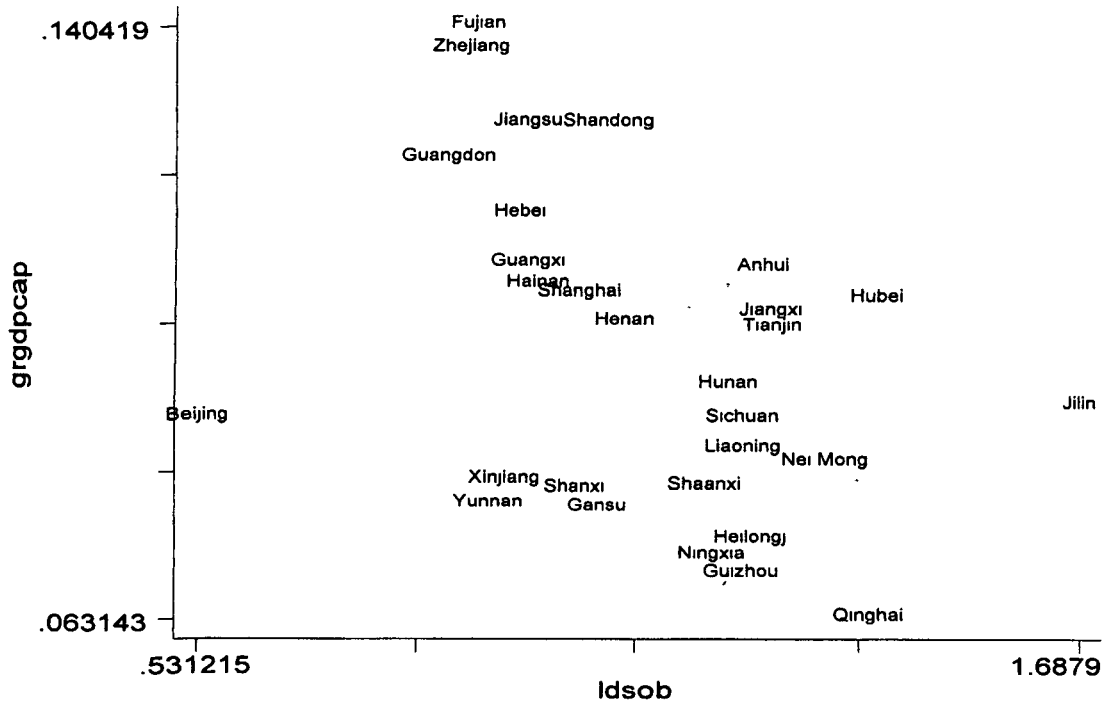


Source: China Statistical Yearbook, Almanac of China Finance and Banking (various issues).

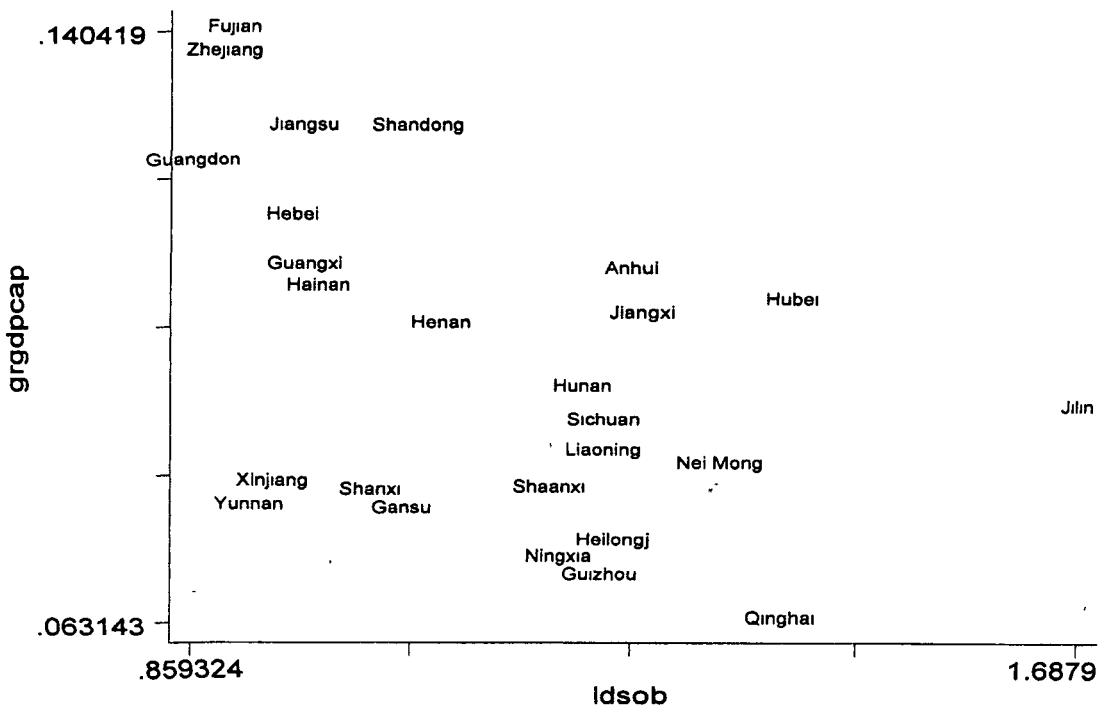
Figure 7a: Central and Real Growth of per Capita GDP

(full sample, 1990-1999, average values)

Full Sample



Restricted Sample (without the three municipalities of Beijing, Tianjin and Shanghai)

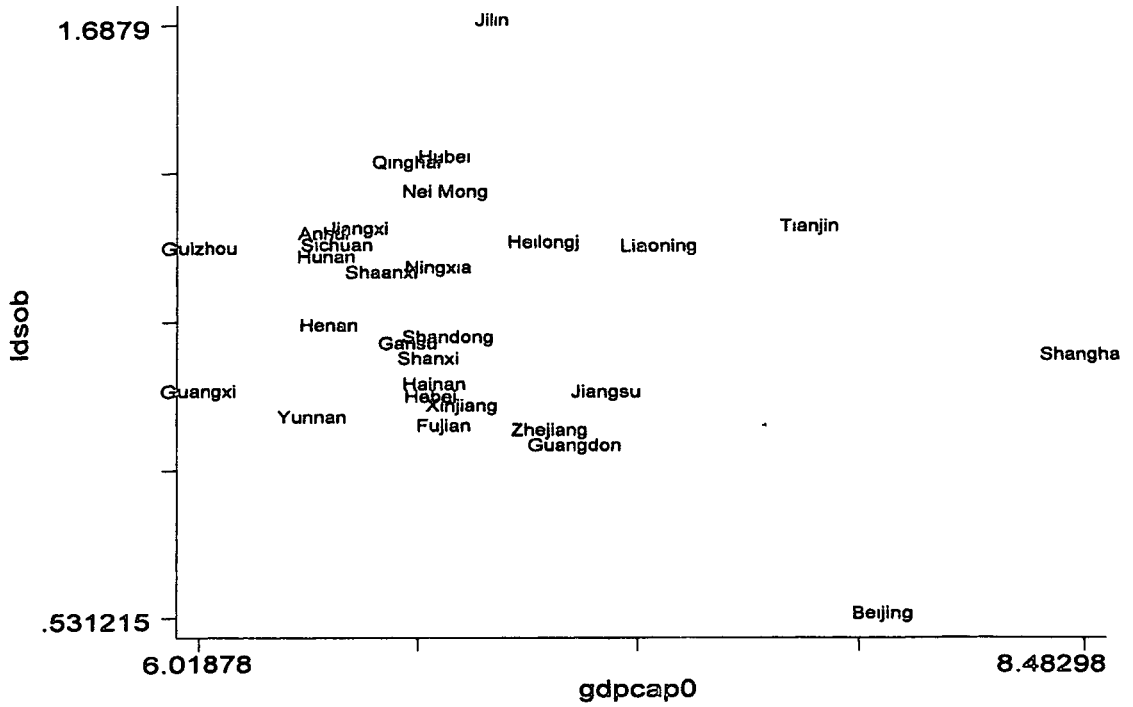


Source: China Statistical Yearbook, Almanac of China Finance and Banking (various issues).

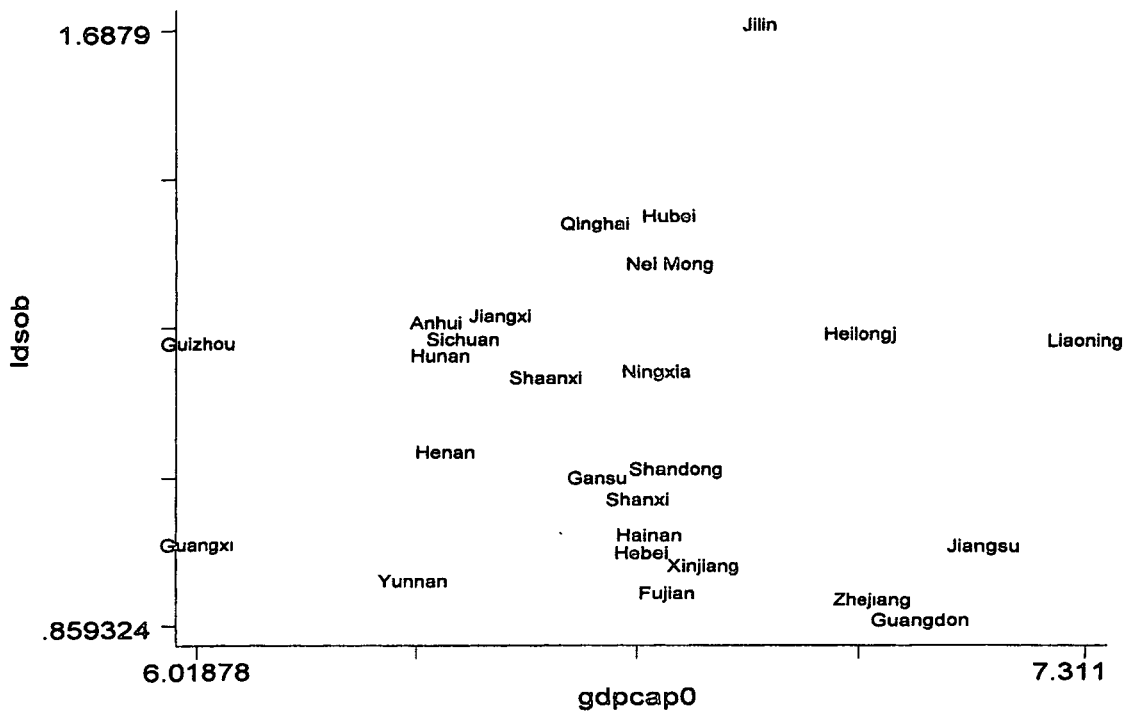
Figure 7b: Central and Initial Level of Capita GDP

(restricted sample, 1990-1999, average values)

Full Sample



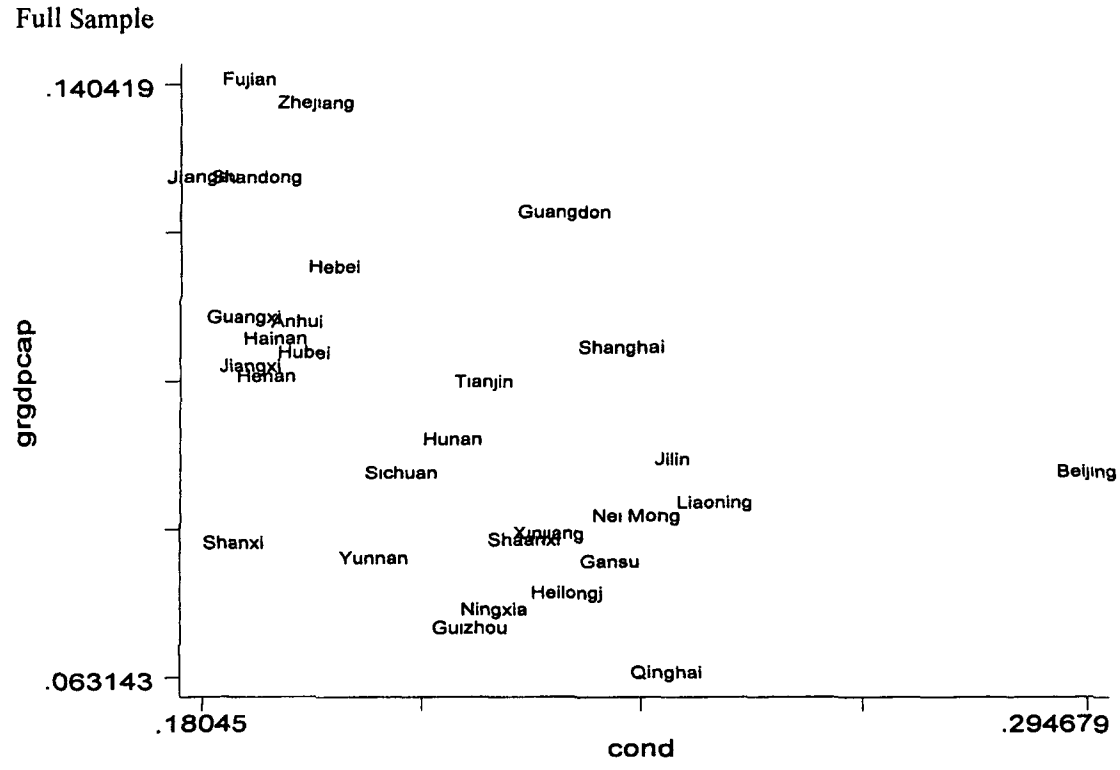
Restricted Sample (without the three municipalities of Beijing, Tianjin and Shanghai)



Source: China Statistical Yearbook, Almanac of China Finance and Banking (various issues).

Figure 8a: Concentration and Real Growth of per Capita GDP

(full sample, 1990-1999, average values)

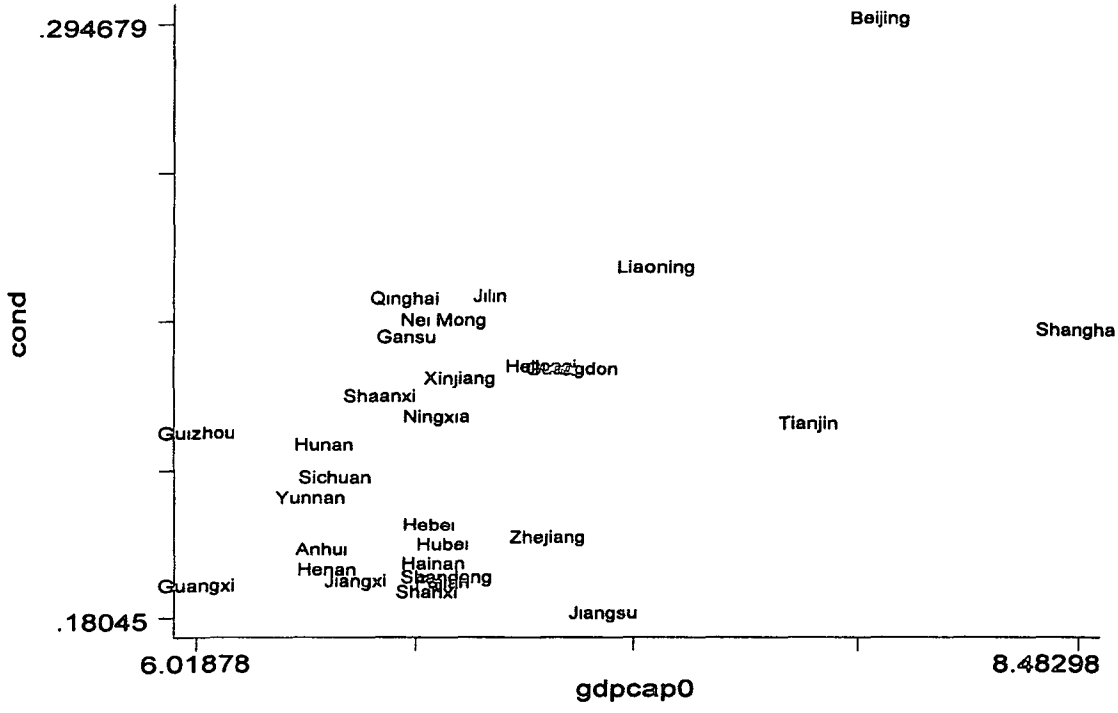


Source: China Statistical Yearbook, Almanac of China Finance and Banking (various issues).

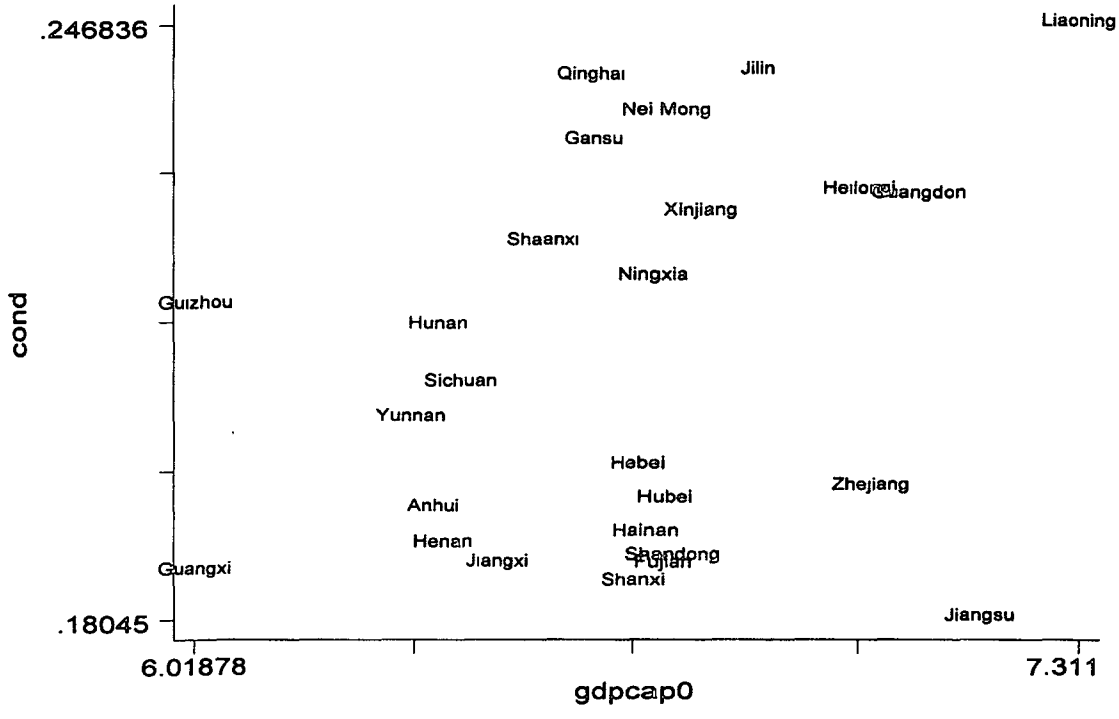
Figure 8b: Concentration and Initial Level of Capita GDP

(restricted sample, 1990-1999, average values)

Full Sample



Restricted Sample (without the three municipalities of Beijing, Tianjin and Shanghai)



Source: China Statistical Yearbook, Almanac of China Finance and Banking (various issues).

Figure 9.1: Size and Non-State Production

(1990-1994, average values)

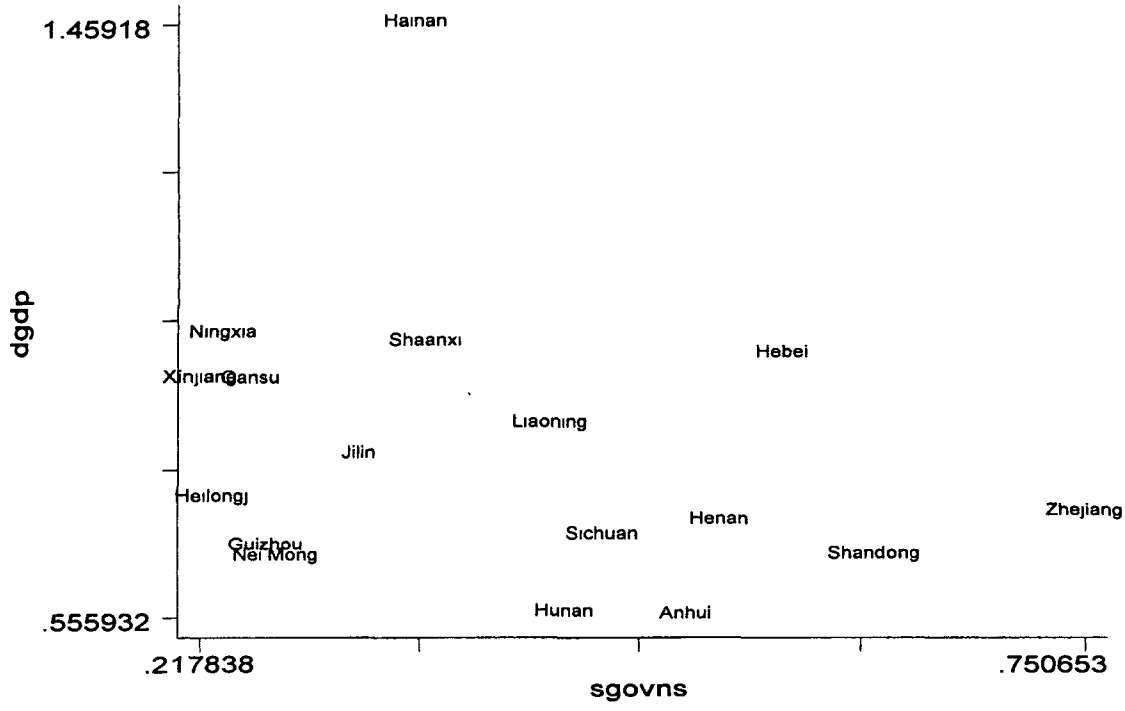
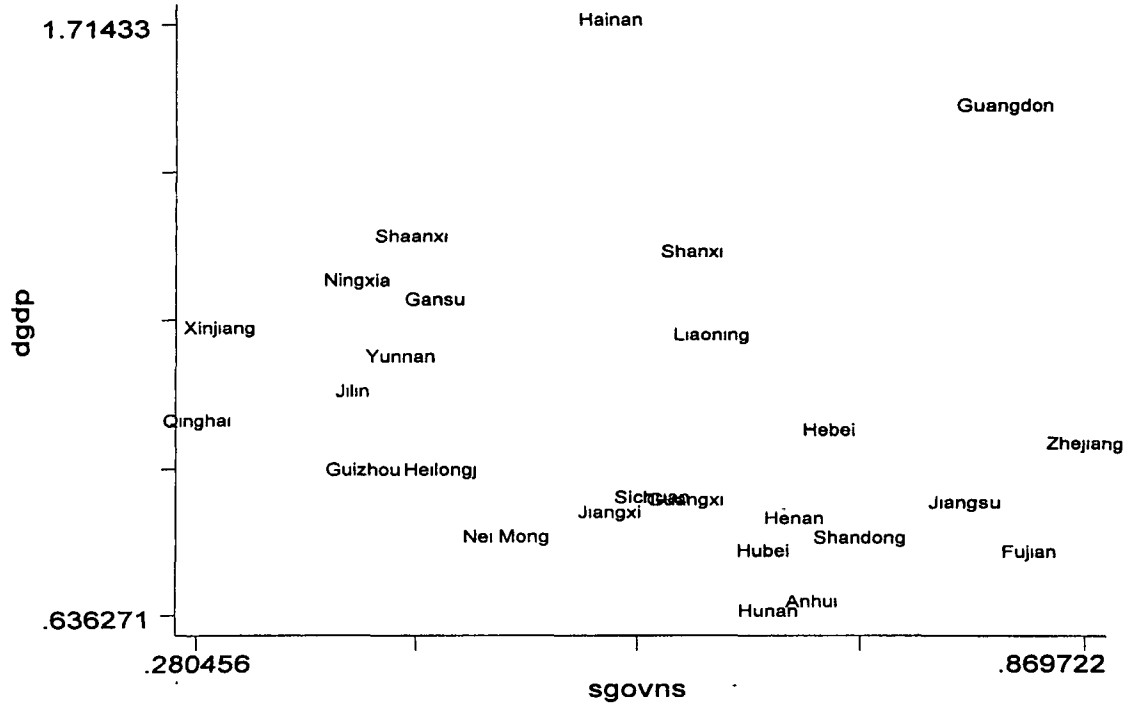


Figure 9.2: SIZE and Non-State Production

(1995-1999, average values)



Source: China Statistical Yearbook, Almanac of China Finance and Banking (various issues).

Figure 10: Sob and Non-State Production (1990-1999, average values)

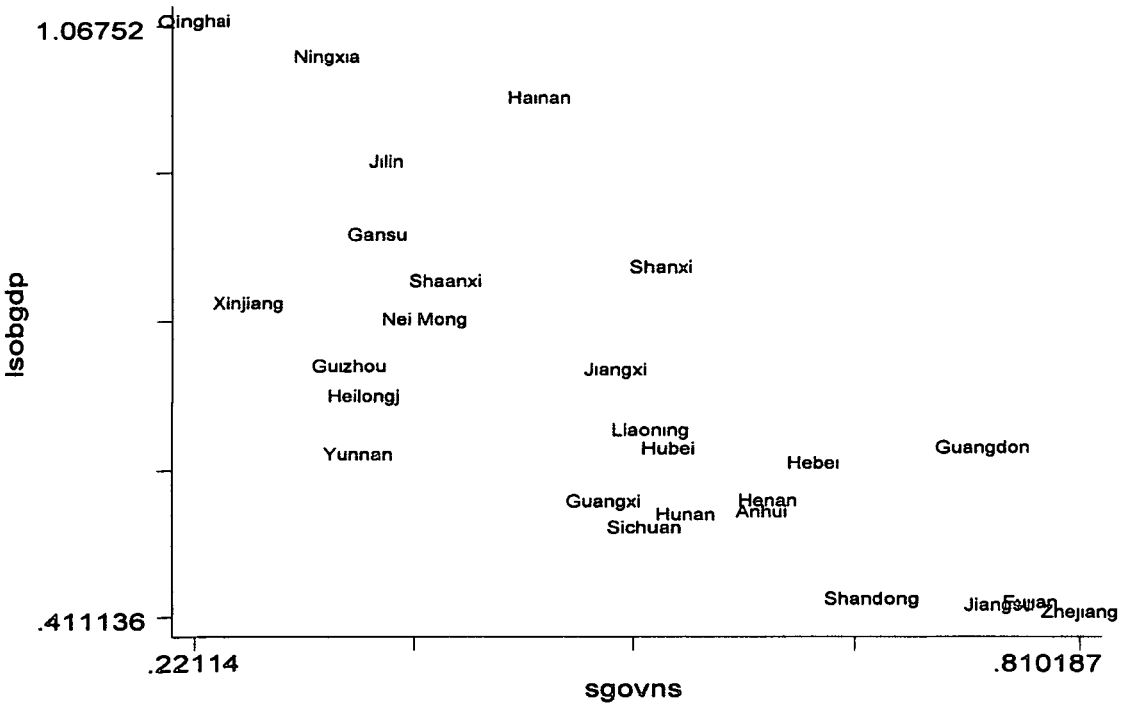
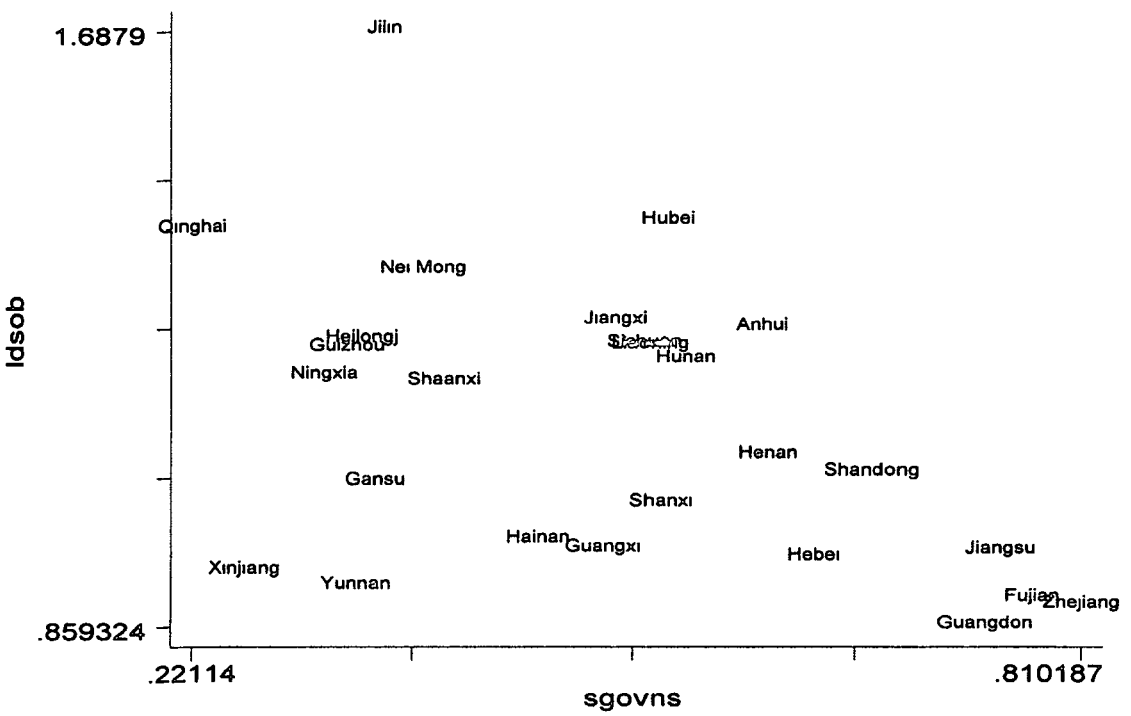
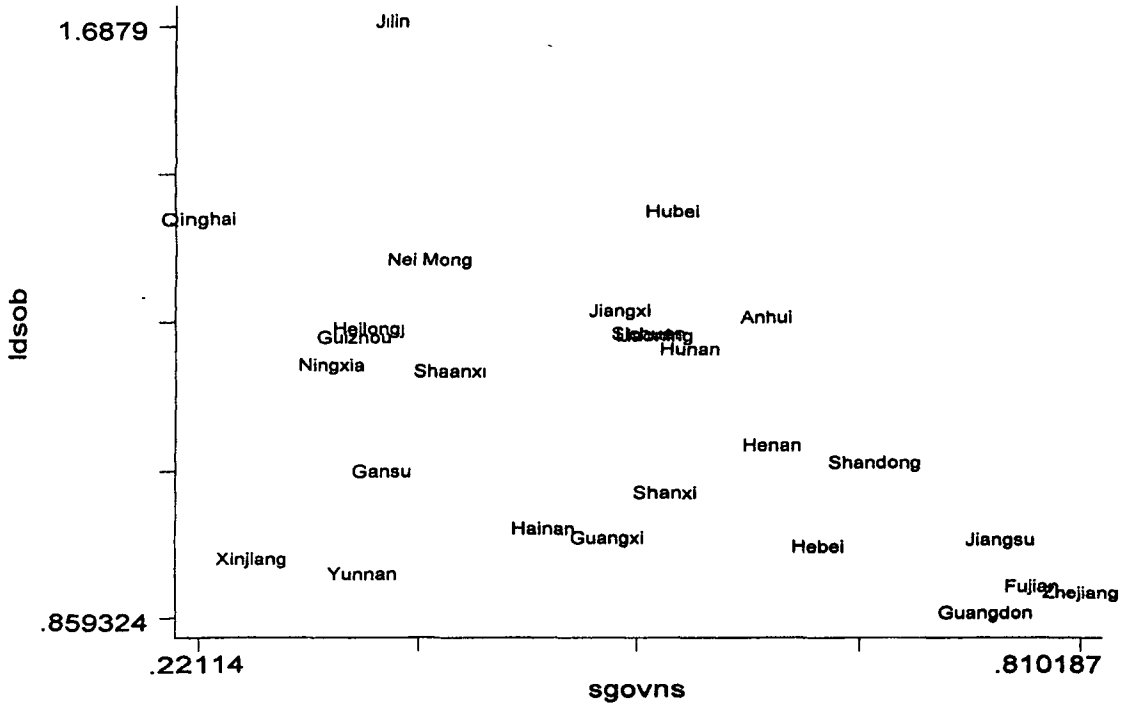


Figure 11: CENTRAL and Non-State Production (1990-1999, average values)



Source: China Statistical Yearbook, Almanac of China Finance and Banking (various issues).

Figure 12: Concentration and Non-State Production (1990-1999, average values)



Source: China Statistical Yearbook, Almanac of China Finance and Banking (various issues).

Table 1a: Feldstein-Horioka Test for Capital Mobility

(Within)

	Explanatory variables:			
	Saving rate	r2	# provinces	# obs
Dependent variables:				
(1.a) Investment rate	0.532			
	(0.059)***	0.79	25	400
(2.a) Investment rate - central budget financing	0.518			
	(0.065)***	0.78	25	362

Table 1b : Feldstein-Horioka Test for Capital Mobility

(2SLS)

	Explanatory variables:				
	Saving rate	Share of food in consumption	r2	# provinces	# obs
Dependent variables:					
(1.b) investment rate	1.371		0.03	25	400
	(0.565)**				
(2.b) Investment rate - central budget financing	1.340		0.12	25	362
	(0.601)**				
(3.b) Saving rate *		-0.218	0.84	25	400
		(0.094)**			

All the regressions include individual and time fixed effects.
Robust standard errors are in parentheses, * (**) (***) indicate significance at the 10 (5) (1) percent levels
* Instrumental regression.
** The r2 levels are lower in the 2SLS regressions because they account only for the explanatory variables.
In the OLS regressions, the r2 account for both the explanatory variables and the time fixed effects.
Period: 1985-2000, 26 provinces. The three municipalities of Beijing, Tianjin and Shanghai are excluded.
Due to data non-availability, Tibet is excluded from the sample.

Table 2a: Descriptive Statistics - Average Values (1990-99)

	GDP per capita									Non-state
	Growth rate	Initial (log)	SIZE	SOB	CENTRAL	CONCENTRATION	Investment rate	Schooling	Fdi	production
Beijing	9%	7.93	274%	98%	0.53	0.29	50%	69%	6%	43%
Tianjin	10%	7.73	117%	104%	1.29	0.22	40%	55%	9%	62%
Hebei	12%	6.67	96%	58%	0.95	0.20	31%	43%	2%	64%
Shanxi	8%	6.66	129%*	79%	1.03	0.18	29%	47%	1%	53%
Nei Mongolia	8%	6.71	71%	74%	1.35	0.24	29%	43%	0%	38%
Liaoning	9%	7.31	99%	61%	1.25	0.25	29%	53%	4%	53%
Jilin	9%	6.84	92%	91%	1.69	0.24	28%	51%	2%	35%
Heilongjiang	7%	6.99	81%	65%	1.26	0.23	25%	50%	1%	33%
Shanghai	11%	8.48	145%	89%	1.03	0.23	48%	66%	7%	52%
Jiangsu	13%	7.16	83%*	42%	0.96	0.18	32%	44%	5%	76%
Zhejiang	14%	7.01	83%	41%	0.89	0.20	36%	40%	2%	81%
Anhui	11%	6.37	60%	52%	1.27	0.19	24%	34%	1%	60%
Fujian	14%	6.71	74%*	42%	0.90	0.19	28%	31%	11%	78%
Jiangxi	10%	6.46	81%*	68%	1.28	0.19	22%	35%	1%	50%
Shandong	13%	6.72	71%	43%	1.07	0.19	27%	39%	3%	67%
Henan	10%	6.38	75%	54%	1.09	0.19	27%	44%	1%	61%
Hubei	10%	6.71	74%*	59%	1.42	0.19	27%	41%	2%	54%
Hunan	9%	6.38	60%	52%	1.23	0.21	23%	40%	2%	55%
Guangdong	12%	7.08	155%*	59%	0.86	0.23	37%	39%	12%	75%
Guangxi	11%	6.02	83%*	53%	0.97	0.19	25%	34%	3%	50%
Hainan	11%	6.68	171%*	98%	0.98	0.19	47%	41%	14%	45%
Guizhou	7%	6.02	78%	68%	1.25	0.22	25%	23%	0%	32%
Yunnan	8%	6.34	110%*	59%	0.91	0.20	30%	23%	0%	33%
Shaanxi	8%	6.53	115%	78%	1.20	0.22	31%	42%	2%	39%
Gansu	8%	6.61	106%	83%	1.06	0.23	29%	32%	1%	34%
Qinghai	6%	6.60	98%*	107%	1.41	0.24	39%	27%	0%*	22%
Ningxia	7%	6.69	111%	103%	1.21	0.22	40%	38%	0%	31%
Xinjiang	8%	6.76	103%	75%	0.94	0.23	42%	37%	0%*	26%
Sichuan+Chongqing**	9%	6.41	76%	51%	1.25	0.21	27%	34%	1%	52%

* averaged over 1995-1999

**Chongqing city was given a municipality status in 1997, and was before this date part of Sichuan province. The statistics of Sichuan province and Chongqing city were therefore aggregated from 1997 onwards.

Due to data unavailability, Tibet is excluded from the sample.

Source: see data description in appendix.

Table 2b: Descriptive Statistics: Correlations

		Banking Indicators			*Control Variables*			
		SIZE	Central	CONCENTRATION	Investment rate	Schooling	Non-state production	Fdi
Control Variables	Investment rate					0.94	0.85	0.96
	Schooling						0.64	0.81
	Non-state production							0.93
Banking Indicators	SOB	0.33	0.96	0.95	-0.76	-0.50	-0.92	-0.91
	SIZE		0.04	0.03	0.32	0.59	-0.16	0.04
	Central			0.99	-0.91	-0.72	-0.93	-0.98
	CONCENTRATION				-0.92	-0.74	-0.96	-0.99

Table 3a: Financial Intermediation and Economic Growth: Augmented Solow Model (GMM-System)

	1a		2a		3a		4a		5a	
Initial GDP per capita	1.059	***	0.950	***	0.979	***	1.008	***	1.015	***
	0.038		*0.029*		*0.043*		*0.078*		*0.053*	
Investment rate	0.208		0.317		0.132		0.373		0.393	
	0.164		*0.170*		*0.206*		*0.242*		*0.335*	
Schooling	0.343		0.235		0.344		0.030		0.130	
	0.457		*0.186*		*0.220*		*0.522*		*0.427*	
SIZE	-0.148	***							-0.044	
	0.033								*0.053*	
SOB			-0.207	***						
			0.045							
CENTRAL					-0.243	***				
					0.075					
CONCENTRATION							-2.151	***	-1.625	***
							0.653		*0.529*	
Sargan Test	21.580		22.030		17.740		19.490		19.260	
AR(2) Test	-1.046		-1.248		-0.966		-1.401		-1.199	
Observations	98		104		104		101		98	
Provinces	26		26		26		26		26	
Beta-convergence rate*:	ns		2.6%	*	ns		ns		ns	

ns: non significant.

The regressions are panel regressions, which include time, fixed effects, with data averaged over 2-year period from 1990-1999, and using lagged differences and level values as instruments, as described in the text.

The null hypothesis of the Sargan test is that the instruments are not correlated with the residuals. The null hypothesis of the serial correlation test is that the errors in the first-difference regression exhibit no second-order serial correlation.

Robust standard errors are in parentheses, * (**) (***) indicate significance at the 10 (5) (1) percent levels.

*Beta convergence significance is assessed by testing whether the coefficient of the initial GDP per capita is significantly smaller than unity. The convergence rate is calculated by applying the following formula: $-\ln(\alpha_0)/T$, where T=2 is the time spell and α_0 is the coefficient of the initial GDP per capita.

Table 3b: Financial Intermediation and Economic Growth: Controlling for the State Sector (GMM-System)

	1b	2b	3b	4b	5b
Initial GDP per capita	0.976 ***	0.907 ***	0.908 ***	0.930 ***	0.935 ***
	0.039	*0.035*	*0.029*	*0.046*	*0.045*
Investment rate	0.172	0.208	0.148	0.354 ***	0.231 ***
	0.180	*0.158*	*0.216*	*0.136*	*0.199*
Schooling	-0.025	0.312	0.552 ***	0.191	0.269
	0.323	*0.206*	*0.230*	*0.395*	*0.445*
Non-state production	0.237 ***	0.226 ***	0.208 ***	0.198 ***	0.209 ***
	0.078	*0.086*	*0.077*	*0.096*	*0.069*
SIZE	-0.010				0.021
	0.051				*0.053*
SOB		-0.084			
		0.083			
CENTRAL			-0.150 ***		
			0.046		
CONCENTRATION				-1.479 **	-1.213 **
				0.702	*0.462*
Sargan Test	20.130	20.360	17.830	17.120	17.400
AR(2) Test	-1.020	-1.245	-1.218	-1.262	-1.180
Observations	98	104	104	101	98
Provinces	26	26	26	26	26
Beta-convergence rate:	ns	4.9% ***	4.8%	ns	ns

ns: non significant .

The regressions are panel regressions, which include time, fixed effects, with data averaged over 2-year period from 1990-1999, and using lagged differences and level values as instruments, as described in the text.

The null hypothesis of the Sargan test is that the instruments are not correlated with the residuals. The null hypothesis of the serial correlation test is that the errors in the first-difference regression exhibit no second-order serial correlation.

Robust standard errors are in parentheses, * (**) (***) indicate significance at the 10 (5) (1) percent levels.

*Beta convergence significance is assessed by testing whether the coefficient of the initial GDP per capita is significantly smaller than unity. The convergence rate is calculated by applying the following formula: $-\ln(\alpha_0)/T$, where T=2 is the time spell and α_0 is the coefficient of the initial GDP per capita.

Table 3c: Financial Intermediation and Economic Growth: Controlling for Foreign Direct Investment

(GMM-System)

	1c		2c		3c		4c		5c	
Initial GDP per capita	0.984	***	0.903	***	0.929	***	0.906	***	0.970	***
	0.036		*0.039*		*0.052*		*0.058*		*0.050*	
Investment rate	0.431	*	0.377	*	0.269		0.242		0.320	
	0.243		*0.176*		*0.210*		*0.163*		*0.233*	
Schooling	-0.013		0.279		0.575	*	0.126		0.057	
	0.202		*0.253*		*0.307*		*0.385*		*0.329*	
Non-state production	0.368	***	0.154	***	0.219	***	0.227	***	0.280	***
	0.067		*0.073*		*0.076*		*0.071*		*0.076*	
Foreign direct investment	-0.833		-0.069		-0.314		0.193		-0.628	
	0.426		*0.378*		*0.437*		*0.456*		*0.640*	
SIZE	0.046								0.093	
	0.057								*0.064*	
SOB			-0.197	**						
			0.092							
CENTRAL					-0.182	**				
					0.071					
CONCENTRATION							-0.926		-1.356	**
							0.619		*0.666*	
Sargan Test	19.780		19.490		17.020		16.480		15.960	
AR(2) Test	-1.304		-1.265		-1.207		-1.198		-1.289	
Observations	96		102		102		99		96	
Provinces	26		26		26		26		26	
Beta-convergence rate:	ns		5.1%		ns		4.9%		ns	

ns: non significant.

The regressions are panel regressions, which include time, fixed effects, with data averaged over 2-year period from 1990-1999, and using lagged differences and level values as instruments, as described in the text.

The null hypothesis of the Sargan test is that the instruments are not correlated with the residuals. The null hypothesis of the serial correlation test is that the errors in the first-difference regression exhibit no second-order serial correlation.

Robust standard errors are in parentheses, * (**) (***) indicate significance at the 10 (5) (1) percent levels.

*Beta convergence significance is assessed by testing whether the coefficient of the initial GDP per capita is significantly smaller than unity. The convergence rate is calculated by applying the following formula: $-\ln(\alpha_0)/T$, where T=2 is the time spell and α_0 is the coefficient of the initial GDP per capita.

Table 4a: Financial Intermediation and Economic Growth: Alternative Estimators (Diff-GMM and Within)

	Diff 1	Diff 2	Diff 3	Diff 4	Diff 5	within 1'	within 2'	within 3'	within 4'	within 5'
Initial GDP per capita	0.521 ***	0.538 ***	0.597 ***	0.563 ***	0.527 ***	0.536 ***	0.523 ***	0.582 ***	0.556 ***	0.570 ***
	0.092	*0.071*	*0.067*	*0.086*	*0.076*	*0.074*	*0.081*	*0.064*	*0.082*	*0.064*
Investment rate	0.251	0.243	0.204	0.260	0.193	0.310 **	0.361 ***	0.279 ***	0.283 ***	0.295 ***
	0.226	*0.174*	*0.099*	*0.190*	*0.153*	*0.132*	*0.095*	*0.054*	*0.091*	*0.093*
Schooling	0.288	-0.039	0.077	0.096	0.225	0.383	0.183	0.283	0.222	0.211
	0.467	*0.409*	*0.335*	*0.441*	*0.344*	*0.443*	*0.303*	*0.249*	*0.350*	*0.349*
Non-state production	-0.018	-0.043	0.016	-0.005	0.013	-0.040	-0.050	-0.024	-0.029	-0.032
	0.095	*0.098*	*0.088*	*0.120*	*0.086*	*0.105*	*0.098*	*0.087*	*0.109*	*0.097*
SIZE	-0.056				-0.060	0.043				0.039
	0.072				*0.057*	*0.083*				*0.071*
SOB		-0.152 **					-0.198 ***			
		0.062					*0.065*			
CENTRAL			-0.133 ***					-0.165 ***		
			0.004					*0.047*		
CONCENTRATION				-0.565	-0.480				-0.738 ***	-0.823 **
				0.349	*0.309*				*0.319*	*0.379*
Sargan Test	21.000	19.000	20.300	20.540	19.630					
AR(2) Test	-1.494	-1.684	-1.516	-1.528	-1.448					
Observations	98	104	104	101	98	98	104	104	101	98
Provinces	26	26	26	26	26	26	26	26	26	26
R2						0.98	0.98	0.99	0.99	0.98
Beta-convergence rate:	33% ***	31% ***	26% ***	29% ***	32% ***	31% ***	32% ***	27% ***	29% ***	28% ***

The regressions are panel regressions, which include time fixed effects., with data averaged over 2-year period from 1990-1999

Robust standard errors are in parentheses, * (**) (***) indicate significance at the 10 (5) (1) percent levels

*Beta convergence is assessed by testing whether the coefficient of the initial GDP per capita is significantly smaller than unity. The convergence rate is calculated by applying the following formula: $-\ln(\alpha 0)/T$, where T=2 is the time spell and $\alpha 0$ is the coefficient of the initial GDP per capita.

Table 4b: Financial Intermediation and Economic Growth: Alternative Estimators (OLS-Level)

	1"	2"	3"	4"	5"
Initial GDP per capita	0.963 ***	0.952 ***	0.959 ***	0.988 ***	0.989 ***
	0.019	*0.019*	*0.019*	*0.014*	*0.015*
Investment rate	0.224 ***	0.294 ***	0.134 ***	0.169 ***	0.190 ***
	0 063	*0.100*	*0.047*	*0.048*	*0.059*
Schooling	0.099	0.102	0.105	0.062	0.083
	0.081	*0.092*	*0.105*	*0.075*	*0.072*
Non-state production	0.260 ***	0.204 ***	0.236 ***	0.196 ***	0.186 ***
	0.027	*0.043*	*0.036*	*0.032*	*0.034*
SIZE	-0.022				-0.014
	0.016				*0.011*
SOB		-0.094 ***			
		0.047			
CENTRAL			-0.056 ***		
			0.045		
CONCENTRATION				-0.822 ***	-0.830 ***
				0.223	*0.242*
Observations	98	104	104	101	98
Provinces	26	26	26	26	26
R2	0.99	0.99	0.99	0.99	0.99
Beta-convergence rate:	1.9%	2.5%	2.1%	ns	ns

The regressions are panel regressions, which include time fixed effects., with data averaged over 2-year period from 1990-1999

Robust standard errors are in parentheses, * (**) (***) indicate significance at the 10 (5) (1) percent levels.

ns: non significant

*Beta convergence is assessed by testing whether the coefficient of the initial GDP per capita is significantly smaller than unity. The convergence rate is calculated by applying the following formula: $-\ln(\alpha 0)/T$, where T=2 is the time spell and $\alpha 0$ is the coefficient of the initial GDP per capita.

Table 5a: Financial Intermediation and Economic Growth: Without Investment

	1	2	3	4	5
Initial GDP per capita	0.985 ***	0.967 ***	0.937 ***	0.977 ***	0.921
	0.0411	*0.033*	*0.033*	*0 026*	*0.052*
Schooling	-0.045	0.154	0.446 **	-0.098	-0.132
	0 243	*0.127*	*0.210*	*0.185*	*0.476*
Non-state production	0.244 **	0.244 ***	0.180 ***	0.175 **	0.215
	0.095	*0.093*	*0.046*	*0.079*	*0.104*
SIZE	0.015				0.045
	0.069				*0.066*
SOB		0.033			
		0.077			
CENTRAL			-0.146 ***		
			0.051		
CONCENTRATION				-1.045 ***	-1.529
				0.382	*0.579*
Sargan Test	22.450	21.720	19.060	21.300	21.450
AR(2) Test	-1.168	-1.320	-1.146	-1.131	-1.140
Observations	98	104	104	101	98
Provinces	26	26	26	26	26
R2	0.99	0.99	0.99	0.99	0.99
beta-convergence rate:		-1.7% *			
t (10%, 5%, 1%) = 1.66 (2.275, 2.625)	-0.365	-1.000 *	-1.909	-0.885	-1.519
Initial GDP per capita < 1	-0.015	-0.033	-0.063	-0.023	-0.079

ns: non significant .

The regressions are panel regressions, which include time fixed effects., with data averaged over 2-year period from 1990-1999

Robust standard errors are in parentheses, * (**) (***) indicate significance at the 10 (5) (1) percent levels.

Table 5b: Financial Intermediation and Economic Growth: With Coastal Dummy

	1	2	3	4	5
Initial GDP per capita	0.887 ***	0.800 ***	0.876 ***	0.896	0.914 ***
	0.079	*0.077*	*0 086*	*0.077*	*0.070*
Investment rate	0.237	0.261 **	0.130	0.290	0.251
	0.207	*0.115*	*0.057*	*0 229*	*0 234*
Schooling	0.354	0.434	0.483	0.091	0.265
	0.081	*0.298*	*0.353*	*0.291*	*0.399*
Non-state production	0.217 ***	0.176	0.226 ***	0.199 **	0.197 ***
	0.081	*0.118*	*0.067*	*0.078*	*0.081*
SIZE	-0.046				0.016
	0.074				*0 0160*
SOB		-0.101			
		0.075			
CENTRAL			-0.140 **		
			0.057		
CONCENTRATION				-0.858 *	-1.074 **
				0.506	*0 538*
Coastal dummy	0.030	0.078	0.009	0.042	0.013
	0.053	*0 057*	*0 057*	*0.063*	*0.061*
Sargan Test	20.320	16.540	21.350	19.240	18.760
AR(2) Test	-1.222	-1.181	-1.197	-1.097	-1.185
Observations	98	104	104	101	98
Provinces	26	26	26	26	26
R2	0.99	0.99	0.99	0.99	0.99
beta-convergence rate:		-11.2% *			
t (10%, 5%, 1%) = 1.66 (2.275, 2.625)	-1.430	-2.597	-1.442	-1.351	-1.229
Initial GDP per capita < 1	-0.113	-0.200	-0.124	-0.104	-0.086

ns: non significant.

The regressions are panel regressions, which include time fixed effects., with data averaged over 2-year period from 1990-1999

Robust standard errors are in parentheses, * (**) (***) indicate significance at the 10 (5) (1) percent levels.

Table 6: Financial Intermediation and Economic Growth: Two 5-years Periods

	within	within	within	within	within	gls	gls	gls	gls	gls
	1a	2a	3a	4a	5a	1b	2b	3b	5b	6b
Initial GDP per capita	-0.034	0.147	0.245 **	0.228	0.001	0.922 ***	0.922 ***	0.894 ***	1.056 ***	1.070 ***
	0.114	0.094	0.098	0.140	0.154	0.073	0.064	0.059	0.054	0.062
Schooling	-0.709	0.343	0.241	0.148	-0.160	0.188	0.092	0.325	-0.016	0.011
	1.030	0.948	0.811	1.045	0.220	0.302	0.270	0.263	0.199	0.224
Non-state production	-0.543	-0.224	-0.227	-0.206	-0.528	0.484 ***	0.515 ***	0.444 ***	0.299 ***	0.191
	0.329	0.273	0.260	0.325	0.344	0.128	0.151	0.107	0.105	0.122
Time fixed effect	0.670 ***	0.337 ***	0.253 ***	0.324 ***	0.633 ***	-0.075 *	-0.091 ***	-0.015 ***	-0.170 ***	-0.173 ***
	0.116	0.071	0.080	0.095	0.158	0.039	0.034	0.037	0.034	0.041
SIZE	-0.634 ***				-0.587 ***	0.018				-0.006
	0.203				0.249	0.078				0.057
SOB		-0.325 **					-0.061			
		0.142					0.119			
CENTRAL			-0.254 ***					-0.226 ***		
			0.090					0.075		
CONCENTRATION				-1.036	-0.414				-2.305 ***	-2.660 ***
				0.941	1.173				0.706	0.767
Observations	43	52	52	50	43	43	52	52	50	43
Provinces	26	26	26	26	26	26	26	26	26	26
R2	0.00	0.46	0.55	0.46	0.00	0.96	0.96	0.96	0.97	0.97

ns: non significant.

The regressions are panel regressions, which include time fixed effects., with data averaged over 5-year period between 1990 and 1999

Robust standard errors are in parentheses, * (**) (***) indicate significance at the 10 (5) (1) percent levels.

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